Regulatory Impact Analysis for the Final Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources

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EPA-452/R-19-004

July 2019

Regulatory Impact Analysis for the Final Reconsideration of the Oil and Natural Gas Sector Emission Standards for New, Reconstructed, and Modified Sources

U.S. Environmental Protection Agency

Office of Air Quality Planning and Standards

Health and Environmental Impacts Division

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ACKNOWLEDGEMENTS

In addition to U.S. EPA staff from the Office of Air and Radiation, personnel from the U.S. EPA Office of Policy and SC&A contributed data and analysis to this document.

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1 EXECUTIVE SUMMARY

1.1 Background

This regulatory impact analysis (RIA) accompanies the final reconsideration of certain aspects of the Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources published in the Federal Register on June 3, 2016 ("2016 NSPS OOOOa"). In the 2016 NSPS OOOOa, new source performance standards (NSPS) were established to reduce greenhouse gas emissions and volatile organic compound (VOC) emissions from the oil and natural gas sector. The emission sources covered in the 2016 rule include hydraulically fractured oil and natural gas well completions and fugitive emissions from well sites and compressor stations, and pneumatic pumps. EPA has granted reconsideration of three requirements: fugitive emissions monitoring requirements, well site pneumatic pump standards, and requirements for certification of closed vent system design and capacity by a professional engineer. In addition, EPA is reconsidering additional issues to streamline implementation and cost-effectiveness of compliance, including clarifying definitions.

For purposes of this RIA, we focus on the finalized changes to NSPS OOOOa that result in quantifiable compliance cost or emissions changes compared to an updated baseline. These provisions are those related to the fugitive emissions monitoring and certification by a professional engineer. For details on the other provisions included in this final reconsideration that are not analyzed in this RIA, see the preamble to the Oil and Natural Gas Sector: Emission Standards for New, Reconstructed, and Modified Sources Reconsideration, found in the docket.1 We do not analyze all provisions included in the preamble because we either do not have the data to do so (for example, we do not have the data to analyze how the finalized exemption for fugitive components including and downstream of the custody meter assembly will increase emissions), or because we do not think the provision will lead to meaningful cost savings or emission changes (for example, clarifying the circumstances for pneumatic pump infeasibility determinations).

Under the 2016 NSPS OOOOa, all NSPS-affected well sites are required to perform semiannual monitoring, and all NSPS-affected compressor stations are required to perform quarterly monitoring. On March 12, 2018, EPA finalized a package containing amendments to the 2016 NSPS OOOOa ("Amendments package") to address immediate concerns regarding implementation challenges related to the reliability of emission monitoring equipment during extended periods of extreme cold temperatures on the Alaskan North Slope.2 The Amendment package reduced monitoring frequency at NSPS-affected well sites on the Alaskan North Slope from semiannual to annual. In this final action, EPA is reducing the required monitoring frequency at NSPS-affected compressor stations from quarterly to annual for those on the Alaskan North Slope.

In the 2016 NSPS OOOOa, EPA finalized a requirement for closed vent systems (CVS) on NSPS-affected storage vessels, pneumatic pumps, reciprocating compressors and centrifugal compressors to be certified by a professional engineer, if applicable. In addition, EPA finalized a requirement that a "qualified professional engineer" would have to certify technical infeasibility for sources claiming that routing emissions from a pneumatic pump at a well site to a control device is technically infeasible. The compliance costs for those certifications by a professional engineer were not considered in the 2016 NSPS OOOOa regulatory impact analysis (2016 NSPS RIA).3 This RIA estimates those compliance costs in the updated baseline and the impact of finalizing a change to the requirement to allow certification by an in-house engineer as well.

This analysis estimates the impacts of the final action as compared to an updated baseline, explained in Section 1.2, for the analysis years 2019 through 2025. All monetized impacts of the final action are presented in 2016 dollars. This analysis also includes a presentation of the impacts in a present value (PV) framework. All sources that are affected by the 2016 NSPS OOOOa, starting at the promulgation of the 2016 NSPS OOOOa, are called "NSPS-affected sources." The subset of these sources that experience a change in their requirements due to this final action, are called "reconsideration-affected sources." The universe of reconsideration-affected sources varies across the options being considered. This will be explained more in Section 1.3, below.

1.2 Summary of Updates from the Final 2016 NSPS RIA

This section summarizes the updates made to data, assumptions, source counts, projections and state and local regulations that have been revised or promulgated since the promulgation of the 2016 NSPS OOOOa that affect the projected impacts of the final action quantified in this RIA. These updates include the incorporated of information received during the comment period of this technical reconsideration.4 These updates were combined with unchanged assumptions and methods from the 2016 NSPS RIA to estimate an updated, 2018 baseline. This 2018 baseline represents EPA's best assessment of the current state of the industry. The projected compliance cost and emission impacts of the three options analyzed in this RIA are compared to this updated 2018 baseline.

1.2.1 Summary of Changes Since the Final 2016 NSPS RIA

Updates made to data, assumptions, source counts, projections and state and local regulations that have been revised or promulgated since the promulgation of the 2016 NSPS OOOOa that affect the projected impacts of the final action quantified in this RIA are listed below. These changes in the following list were included in the RIA that accompanied the proposal of this action. Changes due to public comments received during the comment period are listed in the subsequent section.

* Annual Energy Outlook: In the 2016 NSPS OOOOa, we used the 2015 Annual Energy Outlook. For the purposes of this analysis, we are using the most recent publication of the Annual Energy Outlook (AEO), published February 2018.5 The estimates of drilling activity published in the AEO are used to estimate projections of NSPS-affected sources over time, and the estimates of natural gas prices are used to estimate the value of product recovery.

* U.S. Greenhouse Gas Inventory updates: Since the promulgation of the 2016 NSPS OOOOa, the U.S. Greenhouse Gas Inventory (GHGI) has been updated.6 The data from the updated GHGI was used in the projection of NSPS-affected sources over time.

* DrillingInfo: This RIA uses a more recent version of the DrillingInfo dataset than was used for the 2016 NSPS OOOOa.7 The DrillingInfo dataset is used to characterize oil and natural gas wells and completion activity in the base year. The base year is 2014 in this analysis, updated from 2012 in the 2016 NSPS OOOOa RIA.

* State and Local Regulations: Since the promulgation of the 2016 NSPS OOOOa, additional state and local requirements affecting the oil and natural gas sector have

been published, namely regulations in California and general permits in Pennsylvania. In this analysis, we take the requirements from California, Colorado, Ohio, Pennsylvania, Texas, and Utah into account. The requirements in these states are expected to result in broadly similar overall emissions reductions to those expected from the 2016 NSPS OOOO and this reconsideration, though the program designs in each of these states differs from the 2016 NSPS OOOOa and the reconsideration requirements. In the 2016 NSPS RIA, Wyoming's program was included as a program expected to result in broadly similar overall emissions reductions. The requirements in Wyoming were re-examined and are no longer considered to be equivalent for purposes of the RIA because they are facility-specific permit requirements and are not applicable to the entire state.8

* Fugitive Emissions Monitoring Requirements: Since the promulgation of the 2016 NSPS OOOOa, EPA has published a final package which amends the fugitive emissions monitoring requirements for NSPS-affected oil and natural gas well sites on the Alaskan North Slope. The Amendments package reduces the fugitive emissions monitoring frequency for NSPS-affected well sites on the Alaskan North Slope from semiannual, as promulgated in the 2016 NSPS OOOOa, to annual.

* Professional Engineer Certification: The 2016 NSPS OOOOa requires closed vent systems and pneumatic pump technical infeasibility be certified by a professional engineer. The compliance cost of this provision was not quantified in the 2016 NSPS RIA analysis. In this analysis, we are including the compliance cost of the requirement for professional engineer certifications in the baseline.

* Social Cost of Methane: In the 2016 NSPS OOOOa, EPA used an estimate of the global social cost of methane to monetize the climate related benefits associated with reductions in methane emissions. Since the promulgation of the 2016 NSPS OOOOa, Executive Order (E.O.) 13783 has been signed, which directs agencies to ensure that estimates of the social cost of greenhouse gases used in economic analyses are consistent with the guidance contained in the Office of Management and Budget (OMB) Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (E.O. 13783, Section 5(c)). Thus, for this reconsideration, we are using an interim estimate of the domestic social cost of methane to estimate the forgone climate benefits resulting from the increase in methane emissions due to this final action.

* Model Plants: The model plants used to estimate the emissions from a well site, and emission reductions due to the fugitive emissions monitoring requirements, have been updated. The update includes the addition of fugitive emissions components, namely storage vessels. By adding storage vessels to the model plant, base emissions from a wellsite are estimated to be larger, and the reductions due to the monitoring and repair requirements have also increased compared to the base emissions and emission reduction estimates used in the 2016 NSPS RIA.9

* Other: In the 2016 NSPS OOOOa, all dollar figures were presented in 2012 dollars. In this analysis, all estimated compliance costs are presented in 2016 dollars per E.O. 13771 implementation guidance.10 In the 2016 NSPS RIA, we presented regulatory impacts for the snapshot years of 2020 and 2025. For this analysis, we estimate cost savings and emissions changes resulting from changes in compliance activities projected to occur in each year from 2019 through 2025.11 We also discount the annual cost savings to 2016 and present total PV and equivalent annualized value (EAV) over the analysis period.

1.2.2 Summary of Changes Based on Information Received During Comment Period

* Streamlined recordkeeping and reporting requirements: The final rule amends recordkeeping and reporting requirements for well completions and fugitive emissions at well sites and compressor stations. For well completions, the number of data fields required to be recorded and reported have been reduced. For fugitive emissions, the final rule includes several streamlining changes, including replacing the sitemap and observation path with required procedures that ensure that all components are monitored during each survey.12 Based on an assessment of public comments, we revised our estimates of the cost burden of developing and updating the sitemap and obserservation path, as well as recordkeeping costs associated with the fugitive emissions requirements.

We do not believe that the changes to reporting and recordkeeping requirements will affect emissions. For some line items, the requirements were determined to be redundant. In the case of the site map and observation path, the requirement was generalized to allow for other methods of compliance with the primary objective, which is to ensure that all components are monitored during a survey. Details on the costs of and justification for changes to recordkeeping and reporting requirements for fugitive emissions can be found in Section V.B of the preamble.

* Alternative Means of Emissions Limitation (AMEL) for certain state programs: The final rule includes alternative fugitive emissions standards for specific state fugitive emissions program that the EPA has concluded are at least equivalent to the fugitive emissions monitoring and repair requirements in NSPS OOOOa. These programs are in California, Colorado, Ohio, Pennsylvania, Texas, and Utah.13 Alternative fugitive emissions standards may be adopted for the individual well site or compressor station that is subject to fugitive emissions monitoring and repair under the specified requirements in the applicable state program. For example, a well site under an AMEL could comply with those state standards in lieu of the monitoring, repair, recordkeeping, and reporting requirements in the NSPS.

The compliance cost savings of this provision were not quantified in the RIA associated with the proposal of this reconsideration. Based on an assessment of public comments and review of the final provisions in this rule, for this final RIA, we approximate the compliance cost savings to otherwise NSPS OOOOa affected entities in the states listed above by assuming that there is a one-time upfront planning cost and recurring annual cost. The upfront planning cost is incurred at the company level and includes the labor costs of reading the rule, developing a data management plan, and setting up a database. The annual costs are incurred at the site level and include database licensing expenditures and labor expenditures for maintaining the database, managing data, and preparing an annual report. We consider this value a lower bound on savings, since some companies might save more if all their sites are in AMEL states, in which case they will not have to invest in the overall recordkeeping and reporting system.

Notably, the the cost saving benefit of the AMEL does not apply retroactively since we assume that the recordkeeping and reporting costs associated with NSPS OOOOa compliance to date has been already been incurred.

* Engineering certifications for closed vent systems: The final rule includes changes from the proposal in the assumed costs and number of certifications required for closed vent systems. Based on information received in public comment, we revised our assumed labor costs of both professional and in-house engineers upward. In addition, based on our review of compliance reports, the projected number of facilities requiring certifications decreased.

1.2.3 2018 Updated Baseline

Table 1-1 below shows the number of NSPS-affected facilities, methane emission reductions, VOC emission reductions, and the total annualized compliance costs, including the value of product recovery, in 2020 and in 2025 for the fugitive emissions monitoring requirements of the 2016 NSPS OOOOa as estimated in the 2016 NSPS RIA, and under the 2018 updated baseline. The emission reductions presented here are the emission reductions assuming the affected sources were not performing compliance activities prior to the 2016 NSPS OOOOa. The only difference in the requirements between the two estimates stems from the change to the fugitive emissions monitoring requirements for well sites on the Alaskan North Slope, as explained above. Also, as mentioned above, the 2016 NSPS RIA estimates did not include the compliance cost of professional engineer certification. To be consistent, the estimates presented in this table for the 2018 baseline also exclude the compliance cost of professional engineer certification. In addition to the updates related to the Amendments package, it should be noted that the assumptions used to estimate the 2018 baseline values have been updated from those used to estimate the 2016 NSPS RIA values as explained above (for example, projections, state and local regulations and model plants). The 2016 NSPS OOOOa costs presented here do not match the compliance cost estimates for the fugitive emissions monitoring requirements as presented in the 2016 NSPS RIA. This is because compliance costs in the 2016 NSPS RIA are presented in 2012 dollars, and they have been updated to 2016 dollars in this table.

Table 1-1 Estimated Compliance cost and Emission Reductions of the 2016 NSPS OOOOa Fugitive Emissions Monitoring Requirements: 2016 NSPS RIA and Updated 2018 Baseline Comparison

2016 NSPS RIA

2018 Baseline

2020

2025

2020

2025

Counts of NSPS-Affected Fugitive emissions monitoring Sources

94,100

192,300

40,000

91,000

Methane Emission Reductions (short tons)

169,600

346,200

100,000

190,000

VOC Emission Reductions (tons)

46,300

94,500

25,000

50,000

Total Annualized Compliance cost, with Product Recovery (7%, millions, 2016$)

$199

$407

$58

$163

1.3 Regulatory Options Analyzed in this RIA

In this RIA, we examine the effect of this final action relative to the updated 2018 baseline. The sources affected by this reconsideration (termed "reconsideration-affected sources" in this RIA) are a subset of the NSPS-affected sources. The universe of reconsideration-affected sources includes sources of the types affected by this reconsideration that are considered new or modified starting in 2019, as well as sources that were affected by the 2016 NSPS OOOOa before 2019 and are expected to change compliance activity under this final action. Projected new affected well sites on the Alaskan North Slope are not reconsideration-affected sources, since they are not changing compliance activities under this final action. The change in compliance activities (from semiannual as promulgated under the 2016 NSPS OOOOa to annual fugitive emissions monitoring frequency) at those well sites is attributed to the Amendments package. As we assume certifications only happen once, the only affected sources for the final certification requirements are those that become affected starting in 2019.

We also examine the effect of two alternative options that were not chosen to be finalized. The universe of reconsideration-affected sources is different under the different options. Table 1-2 shows the affected sources, points and controls for the 2016 NSPS OOOOa, the updated 2018 baseline and the three options that are analyzed in this RIA. The bolded entries in the table represent the sources that are considered reconsideration-affected sources under each option.

Table 1-2 Emissions Sources and Controls Evaluated for the Regulatory Alternatives

Emissions Point	2016 NSPS OOOOa	2018 Baseline	Option 1	Option 2 (Finalized)	Option 3
Fugitive Emissions Monitoring					
Natural Gas and Oil Well Sites	Semiannual	Semiannual	Semiannual	Semiannual-streamlined	Semiannual -streamlined
Compressor Stations in Gathering and Boosting, Transmission and Storage	Quarterly	Quarterly	Quarterly	Quarterly-streamlined	Semiannual-streamlined
The Alaskan North Slope					
Natural Gas and Oil Well Sites (Alaskan North Slope)	Semiannual	Annual	Annual	Annual- streamlined	Annual- streamlined

Compressor Stations in Gathering and Boosting, Transmission and Storage (Alaskan North Slope)2

Quarterly

Quarterly

Annual

Annual- streamlined

Annual-streamlined

Alternative Means of Emission Limitation

None

None

None

Operations in Six States

Operations in Six States

Certifications

Closed Vent Systems on Pneumatic Pumps, Reciprocating Compressors, Centrifugal Compressors, and Storage Vessels; and Pneumatic Pump Technical Infeasibility

Professional Engineer

Professional Engineer

Professional Engineer

In-House Engineer

In-House Engineer

1 We do not currently have the data to estimate the effects of this final action pertaining to compressors stations on the Alaskan North Slope. All other provisions presented in this table are analyzed in this RIA. Additional provisions included in the preamble are not analyzed because we either do not have the data to do so or because we do not think the provision will lead to meaningful cost savings or emission changes.

The 2016 NSPS OOOOa requires fugitive emissions survey and repair programs be performed semiannually (twice per year) at the NSPS-affected newly drilled or refractured well sites, and quarterly at new or modified gathering and boosting stations and new or modified transmission and storage compressor stations. Closed vent systems and pneumatic pump technical infeasibility must be certified by a professional engineer.

The updated 2018 baseline reflects that fugitive emissions survey and repair programs are now required to be performed only annually at NSPS-affected well sites in the Alaskan North Slope (as promulgated in the Amendments package), semiannually at all other NSPS-affected newly drilled or refractured gas well sites, and quarterly at new or modified gathering and boosting stations and new or modified transmission and storage compressor stations. Closed vent systems and pneumatic pump technical infeasibility must be certified by a professional engineer.

Option 1 (not selected): This option is the most stringent alternative option considered and is not slected for promulgation. The option retains annual monitoring and repair frequency for affected well sites on the Alaskan North Slope and reduces monitoring frequency for affected compressor stations on the Alaskan North Slope. Elsewhere, under this option, fugitive emissions monitoring frequencies are unchanged from the 2016 rule. The certification requirement for closed vent systems and pneumatic pump technical infeasibility is unchanged in the option from the 2016 rule and continues to require a professional engineer for certifications. Under this option, no state programs are certified as AMEL. This option results in reduced regulatory burden related to the reduced monitoring frequency for all compressor stations on the Alaskan North Slope; however, as EPA does not currently have the data to estimate the effects of the final action pertaining to compressors stations on the Alaskan North Slope, this RIA does not present quantitative estimates of reduced regulatory compliance costs or potential emissions increases.

Option 2 (finalized): The finalized Option 2 retains annual monitoring and repair frequency for affected well sites on the Alaskan North Slope and reduces monitoring frequency for affected compressor stations on the Alaskan North Slope. All other NSPS-affected well sites retain the semiannual survey and repair requirement. Monitoring frequency at all other NSPS-affected compressor stations remains at quarterly. Under this option, recording and recordkeeping requirements at all NSPS-affected by fugitive emissions monitoring requirements are streamlined. The certification requirement for closed vent systems and pneumatic pump technical infeasibility is changed to allow companies the option of using an in-house engineer as opposed to requiring a professional engineer.14 Also, in this option, fugitive emissions monitoring programs in six states are certified as AMEL, also reducing reporting and recordkeeping burden with no emission impacts. In aggregate, this finalized option is likely to reduce regulatory compliance costs while having no impact on emissions reductions projected under the 2016 rule.

Option 3 (not selected): This option is the least stringent option analyzed in this RIA. Option 3 is the same as the finalized Option 2 with the exception that monitoring and frequency at compressor stations outside of the Alaskan North Slope is reduced to semiannual, which would lead to an increase in regulatory cost savings relative to the baseline but also a decrease in the projected emission reductions from the 2016 rule. Of the three options presented in this RIA, Option 3 would lead to the largest impact on compliance costs and emissions compared to the 2018 baseline.

1.4 Summary of Results

A summary of the key results of the finalized Option 2 are presented below. All dollar estimates are in 2016 dollars. Also, all compliance costs, emissions changes, and benefits are estimated relative to the updated 2018 baseline.

* Emissions Analysis: The only expected impacts on VOC, methane, and hazardous air pollutant (HAP) emissions from this reconsideration are likely to be from reducing the monitoring frequency for affected compressor stations on the Alaskan North Slope. However, as noted above, EPA does not have information that enables the projection of emissions changes that may result from reducing the frequency of fugitive emision monitoring at the Alaskan sites. All other finalized changes to the NSPS OOOOa are not expected to lead to changes in emissions compared to the 2018 baseline.

* Benefits Analysis: As there are not quantified emissions impacts from the finalized option, the finalized changes to NSPS OOOOa are not expected to result in monetized disbenefits compared to the 2018 baseline.

* Compliance Cost Analysis: Because of reductions in reporting and recordkeeping requirements and the flexibility to use an in-house engineer for CVS certifications, the finalized changes are expected to result in cost savings for the affected firms. The PV of these cost savings, discounted at a 7 percent rate, is estimated to be about $189 million dollars, with an EAV of about $33 million. Under a 3 percent discount rate, the PV of cost savings is $240 million, with an EAV of $37 million.

* Energy Markets Impacts Analysis: The 2016 NSPS RIA estimated small (less than 1 percent) impacts on energy production and markets as a result of the final regulation. EPA expects that this deregulatory action will reduce the impacts estimated for the

final NSPS in the 2016 NSPS RIA.

* Distributional Impacts: The cost savings and any forgone benefits likely to arise from the finalized option are not expected to be felt uniformly across the population, and may not accrue equally to the same individuals, firms, or communities who were projected to be impacted by the 2016 NSPS OOOOa.[15]

* Small Entity Impacts Analysis: EPA expects that this final deregulatory action would reduce the impacts estimated for the final 2016 NSPS OOOOa in the 2016 NSPS RIA. We have therefore concluded that this final action will relieve regulatory burden for all directly regulated small entities and that this final action will not have a Significant Impact on a Substantial Number of Small Entities (SISNOSE).

* Employment Impacts Analysis: EPA expects slight reductions in labor associated with compliance-related activities relating to the reduced reporting and recordkeeping requirements associated with the fugitive emissions monitoring requirements and AMELs. However, due to data limitation, EPA is unable to provide quantitative estimates of compliance-related labor changes.

Table 1-3 presents the estimated annualized compliance costs savings accounting for product recovery and the emission reductions for the updated 2018 baseline, as well as the three options analyzed in this RIA for 2020 and 2025. The rest of this document details the changes estimated as a result of this reconsideration. These changes are estimated as the difference between the 2018 baseline and the option being analyzed.

Table 1-3 Compliance Costs and Emissions Reductions of the 2016 NSPS OOOOa under the Updated 2018 Baseline and the Regulatory Alternatives Evaluated in the RIA

		Facilities Affected	Methane Emission Reductions (short tons)	VOC Emission Reductions (short tons)	Total Annualized Cost, w/ Product Recovery (7%, millions 2016$)
2020	2018 Baseline	54,000	100,000	25,000	$122
	Option 1	54,000	100,000	25,000	$122
	Option 2	54,000	99,000	25,000	$92
	Option 3				

54,000

93,000

24,000

$86

2025

2018 Baseline

106,500

190,000

50,000

$232

Option 1

106,500

190,000

50,000

$232

Option 2

106,500

190,000

50,000

$174

Option 3

107,000

180,000

48,000

$164

Tables 1-4 through 1-6 present the PV and EAV, estimated using discount rates of 7 and 3 percent, of the changes in benefits, costs, and net benefits, as well as the increase in emissions compared to the 2018 baseline for all three options. These values are estimated for the universe of reconsideration-affected sources under each option over the 2019 through 2025 analysis period, discounted to 2016, and are in 2016 dollars. When discussing net benefits, both here and in Section 4, we modify the relevant terminology to be more consistent with traditional net benefits analysis. In the following tables, we refer to the cost savings as the "benefits" of this final action and the forgone benefits as the "costs" of this final action. The net benefits are the benefits (cost savings) minus the costs (forgone benefits). As explained in the following sections, all costs and benefits outlined in this RIA are estimated as the change from the updated 2018 bbaseline.

As shown in Tables 1-4 through 1-6, Option 1 results in no quantified impacts on costs, emissions, and benefits, and Option 3 results in the largest estimated impacts. It should be noted that the estimated costs (forgone benefits) of Option 3 only includes the monetized climate effects of the potential increases in methane emissions, although there would likely be increases in VOC and HAP emissions as well. While we expect that the forgone VOC and HAP emission reductions may also degrade air quality and adversely affect health and welfare, data limitations prevent us from quantifying these effects. A broader explanation of potentially forgone benefits is provided in Section 2.6 of this RIA.

Table 1-4   Cost Savings, Forgone Benefits and Increase in Emissions of Option 1

Compared to the 2018 Baseline, 2019 through 2025 (millions 2016$)1

7%

3%

Present Value

Equivalent Annualized Value

Present Value

Equivalent Annualized Value

Benefits (Total Cost Savings)

$0

$0

$0

$0

Cost Savings

$0

$0

$0

$0

Forgone Value of Product Recovery

$0

$0

$0

$0

Costs (Forgone Domestic Climate Benefits)2

$0

$0

$0

$0

Net Benefits3

$0

$0

$0

$0

Emissions

Total Change

Methane (short tons)

0

VOC

0

HAP

0

Methane (million metric tons CO_2 Eq.)

0

1 This option results in reduced regulatory burden related to the reduced monitoring frequency for all compressor stations on the Alaskan North Slope; however, EPA does not currently have the data to estimate the effects of this final action pertaining to compressors stations on the Alaskan North Slope.

2 The forgone benefits estimates are calculated using estimates of the social cost of methane (SC-CH4). SC-CH4 values represent only a partial accounting of domestic climate impacts from methane emissions. This option is unlikely to affect emissions, therefore there are no monetized forgone benefits as a result of this option.

3 Estimates may not sum due to independent rounding.

Table 1-5 Cost Savings, Forgone Benefits and Increase in Emissions of Finalized Option 2 Compared to the 2018 Baseline, 2019 through 2025 (millions 2016$)1

7%

3%

Present Value

Equivalent Annualized Value

Present Value

Equivalent Annualized Value

Benefits (Total Cost Savings)

$189

$33

$240

$37

Cost Savings

$189

$33

$240

$37

Forgone Value of Product Recovery

$0

$0

$0

$0

Costs (Forgone Domestic Climate Benefits)2

$0

$0

$0

$0

Net Benefits3

$189

$33

$240

$37

Emissions

Total Change

Methane (short tons)

0

VOC

0

HAP

0

Methane (million metric tons CO2 Eq.)

0

1 This option results in reduced regulatory burden related to the reduced monitoring frequency for all compressor stations on the Alaskan North Slope; however, EPA does not currently have the data to estimate the effects of this final action pertaining to compressors stations on the Alaskan North Slope.

2 The forgone benefits estimates are calculated using estimates of the social cost of methane (SC-CH4). SC-CH4 values represent only a partial accounting of domestic climate impacts from methane emissions. See Section 2.6 for more discussion.

3 Estimates may not sum due to independent rounding.

Table 1-6 Cost Savings, Forgone Benefits and Increase in Emissions of Option 3 Compared to the 2018 Baseline, 2019 through 2025 (millions 2016$)1

7%

3%

Present Value

Equivalent Annualized Value

Present Value

Equivalent Annualized Value

Benefits (Total Cost Savings)

$223

$39

$284

$44

Cost Savings

$231

$40

$294

$46

Forgone Value of Product Recovery

$7

$1.3

$9

$1.5

Costs (Forgone Domestic Climate Benefits)2

$2.1

$0.4

$8

$1.3

Net Benefits3

$221

$38

$276

$43

Emissions

Total Change

Methane (short tons)

60,000

VOC

12,000

HAP

400

Methane (million metric tons CO2 Eq.)

1.3

1 This option results in reduced regulatory burden related to the reduced monitoring frequency for all compressor stations on the Alaskan North Slope; however, as EPA does not currently have the data to estimate the effects of the final action pertaining to compressors stations on the Alaskan North Slope.

2 The forgone benefits estimates are calculated using estimates of the social cost of methane (SC-CH4). SC-CH4 values represent only a partial accounting of domestic climate impacts from methane emissions. This option is unlikely to affect emissions, therefore there are no monetized forgone benefits as a result of this option.

3 Estimates may not sum due to independent rounding.

1.5 Organization of this RIA

This analysis follows similar methods to those used to estimate compliance costs of the 2016 NSPS OOOOa. The remainder of this report outlines some of that methodology, with further explanations of instances in which the underlying data, assumptions or methods diverge, as well as the estimated results. For details on the methodology that is unchanged from the 2016 NSPS OOOOa, please see the 2016 NSPS RIA.16 Section 2 describes the emissions and compliance cost analysis of the final action compared to the 2018 baseline. Section 2 also describes the cost savings compared to the 2018 baseline in a PV framework, as well as presents the associated EAV. Section 2 also describes the forgone benefits of this final action compared to the 2018 baseline, including the PV and EAV over the 2019 through 2025 time horizon. Section 3 describes the economic impacts expected as a result of this final action. Section 4 presents a comparison of forgone benefits and cost savings of this final action, as well as the net benefits compared to the updated 2018 baseline.

2 COMPLIANCE COST SAVINGS AND FORGONE EMISSIONS REDUCTIONS

2.1 Introduction

This section describes the emissions and compliance cost analysis for the final reconsideration of the 2016 NSPS OOOOa. Projected incremental changes in emissions and compliance costs resulting this reconsideration are estimated with respect to the current policy baseline. Section 2.2 discusses the updates to data and the approach used in this analysis with respect to the RIA analysis for the 2016 NSPS OOOOa. Section 2.3 describes the steps in the emissions and compliance cost analysis of the requirements that have been reconsidered and presents an overview of results. Section 2.4 presents detailed tables describing the impacts for each source affected by this reconsideration for the analyzed regulatory options. Section 2.5 presents the present value and equivalent annualized value of the cost savings. Section 2.6 presents an analysis of the forgone benefits of this regulatory action. Please see the Background Technical Support Document (TSD) located at Docket ID No. EPA-HQ-OAR-2017-0483 for more detail.

2.2 Emissions Points and Pollution Controls assessed in the RIA

This RIA estimates projected impacts associated with reconsidered requirements for fugitive emissions monitoring and certifications of closed vent system design and technical infeasibility of routing pneumatic pump emissions to an existing control device. In addition, EPA changed requirements related to pneumatic pumps and oil well completions, as well as technical corrections and clarifications, although this RIA does not quantify any changes in emissions or costs resulting from these changes. This section provides a basic description of the emissions sources and controls considered, and which aspects of the final reconsideration have quantified impacts in this RIA. For more detailed information on the requirements that were reconsidered, see the preamble.17 For the other emission sources and controls evaluated in the 2016 NSPS OOOOa, see the 2016 NSPS RIA.18

Fugitive Emissions Monitoring Requirements: Fugitive emissions occur when connection points are not fitted properly or when seals and gaskets start to deteriorate. Pressure, changes in pressure, or mechanical stresses can also cause components or equipment to leak. Potential sources of fugitive emissions include valves, connectors, pressure relief devices, open-ended lines, flanges, closed vent systems, and thief hatches or other openings on a controlled storage vessel. These fugitive emissions do not include devices that vent as part of normal operations. In the 2016 NSPS RIA, EPA estimated compliance costs and emission reductions assuming the use of a leak monitoring program based on the use of optical gas imaging (OGI) leak detection combined with leak correction. In addition, alternative frequencies for fugitive emissions surveys were considered: annual, semiannual, and quarterly. This RIA estimates the changes in impacts from reducing fugitive emissions monitoring frequency from the requirements promulgated in the 2016 NSPS OOOOa on NSPS-affected oil and natural gas facilities. EPA is also making changes to the Alternative Means of Emission Limitation (AMEL) provision, certifying the several fugitive emissions monitoring state programs are equiavlant to NSPS OOOOa, which will lead to reductions in reporting and recordkeeping burden.

Professional Engineer Certifications: Closed vent systems can be used to route emissions from various equipment at oil and natural gas facilities including storage vessels, compressors, and pneumatic pumps to control devices or processes. Closed vent systems must be designed to properly handle the configuration and flow rates of different facilities. For the 2016 NSPS OOOOa, EPA requires closed vent systems be certified by a professional engineer. In addition, the 2016 NSPS OOOOa requires that facilities claiming technically infeasibility in routing emissions from well site pneumatic pumps to an existing control device must get that technical infeasibility certified by a professional engineer. The compliance cost impact of the professional engineer certification requirements was not evaluated in the 2016 NSPS RIA. In this analysis, EPA evaluates the impact of the certification requirements, and the effects of allowing facilities to choose either a professional engineer or an in-house engineer to perform the required certifications.

Additional Reconsideration Topics Not Quantified in this RIA: The reconsideration preamble and regulatory text includes discussion of several finalized technical amendments for which this analysis does not estimate impacts. These include, but are not limited to, the issues described below.19

* Pneumatic Pumps: EPA is finalizing changes in the circumstances for which it may be infeasible to control emissions from well site pneumatic pumps by removing the distinctions between greenfield and non-greenfield sites. These changes are intended to better characterize the circumstances under which control may be infeasible, and thus would not necessarily lead to a change in actual emissions.

* Well Completions: EPA is finalizing changes and clarifications related to the location of separators during flowback operations, recordkeeping requirements for reduced emission completions, and the definition of flowback (e.g., to exclude screenouts, coil tubing cleanouts, and plug drill out processes). Some of these changes could increase cost savings (e.g., by lowering the burden of recordkeeping requirements) or be associated with increases in emissions relative to the 2018 baseline, but EPA does not have sufficiently specific information to quantify these changes.

* Fugitive Emissions Monitoring: In addition to the quantified issues described above, EPA is finalizing changes to fugitive emissions monitoring requirements with respect to the definitions of modification, third party equipment, and underground disposal wells. In addition, EPA is finalizing changes to the repair requirements for fugitive emissions components. Some changes may result in cost savings (e.g., specifying when a modification occurs at a separate tank battery), and some may result in increased emissions (e.g., exempting fugitive components downstream of the custody meter assembly), but EPA does not have the information necessary to quantify these changes.

* Gas Processing Plants: EPA is finalizing an exemption fom LDAR for equipment at gas processing plants that has been in service less than 300 hours per year when the equipment is only used during emergencies, as a backup, or is only in service during startup and shutdown. This may increase costs savings and emissions due to reduced LDAR requirements, but EPA does not have the data necessary to quantify these changes.

* Storage vessels: EPA is finalizing a subcategorization of storage vessels into vessels that are not designed as tank batteries ("Type 1") and tank batteries that meet specific design requirements ("Type 2"), including being equipped a CVS that is designed and operated to route vapors back to the process or to a control device with a manufacturer-designed destruction efficiency of at least 95 percent for VOC emissions. For tank batteries that do not meet the 95 percent control requirement, the potential VOC emissions must be determined on an individual uncontrolled storage vessel basis. This amendment may provide cost savings for facilities because "Type 2" storage vessels would not be subject to the control, monitoring, recordkeeping, and reporting required under the NSPS. While cost savings and emissions may depend on what proportion of tank batteries meet the 95 percent control requirement, EPA does not have the information necessary to project the impacts of this distinction.

2.3 Compliance Cost Analysis

In this section, we provide an overview of the compliance cost analysis used to estimate the difference in the private expenditures to the industry when complying with the reconsidered rule compared to the 2016 NSPS OOOOa under the updated 2018 baseline. Updates to the data and analysis approach from the 2016 NSPS RIA are described in Section 1.2 of this RIA. A detailed discussion of the methodology, data and assumptions used to estimate the compliance cost impacts of this reconsideration that have been updated since the 2016 NSPS RIA is presented in the TSD.20 The methodology, data and assumptions that are not discussed here are the same as were used in the 2016 NSPS RIA, and can be found in the 2016 NSPS Final TSD for that action.21

The following sections describe each step in the compliance cost analysis. First, representative facilities are established for each affected source category, including baseline emissions and the control options. Second, the number of incrementally affected facilities under the 2018 baseline for each type of equipment or facility are projected, and the reconsideration-affected sources are estimated. The change in national emissions and compliance cost estimates are calculated by multiplying representative factors from the first step, by the estimated number of reconsideration-affected facilities in each projection year from the second step. In addition to emissions reductions, some control options may result in natural gas recovery, which can then be combusted for useful processes or sold. The change in national compliance cost estimates include the change in estimated revenue from product recovery, where applicable.

In this section, we present the projected effects of the final action on compliance costs and emissions from 2019 through 2025, under the assumption that 2019 is the first year the reconsidered requirements will be in effect. We chose to analyze through 2025 due to limited information, as explained in Section 2.3. In addition, in this section, we are providing analysis for 2020 and 2025, which allows the reader to draw comparisons to the 2016 NSPS RIA. Comparing the 2016 NSPS RIA results to this analysis should be done with caution. The baseline of affected sources has been updated in this analysis, as explained in Section 2.3, and results in this RIA are presented in 2016 dollars, while the 2016 NSPS RIA results are presented in 2012 dollars.

2.3.1 Regulatory Options

For each reconsideration-affected emission source, point, and control option, the TSD develops a representative facility (also referred to as a model plant). The characteristics of this facility include typical equipment, operating characteristics, and representative factors including baseline emissions and the compliance costs, emissions reductions, and product recovery resulting from each control option. In this RIA, we examine three broad regulatory options. Table 2-1 shows the emissions sources, points, and controls for 2016 NSPS OOOOa, the updated 2018 baseline, and three alternative options, as described in Section 1.

Table 2-1 Emissions Sources and Controls Evaluated for the Regulatory Alternatives

Emissions Point	2016 NSPS OOOOa	2018 Baseline	Option 1	Option 2 (Finalized)	Option 3
Fugitive Emissions Monitoring					
Natural Gas and Oil Well Sites	Semiannual	Semiannual	Semiannual	Semiannual-streamlined	Semiannual -streamlined
Compressor Stations in Gathering and Boosting, Transmission and Storage	Quarterly	Quarterly	Quarterly	Quarterly-streamlined	Semiannual-streamlined

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The Alaskan North Slope

Natural Gas and Oil Well Sites (Alaskan North Slope)

Semiannual

Annual

Annual

Annual- streamlined

Annual- streamlined

Compressor Stations in Gathering and Boosting, Transmission and Storage (Alaskan North Slope)2

Quarterly

Quarterly

Annual

Annual- streamlined

Annual-streamlined

Alternative Means of Emission Limitation

None

None

None

Operations in Six States

Operations in Six States

Certifications

Closed Vent Systems on Pneumatic Pumps, Reciprocating Compressors, Centrifugal Compressors, and Storage Vessels; and Pneumatic Pump Technical Infeasibility

Professional Engineer

Professional Engineer

Professional Engineer

In-House Engineer

In-House Engineer

1 We do not currently have the data to estimate the effects of the final actions pertaining to compressors stations on the Alaskan North Slope. All other provisions presented in this table are analyzed in this RIA. Additional provisions included in the preamble are not analyzed because we either do not have the data to do so or because we do not think the provision will lead to meaningful cost savings or emission changes.

In addition to the requirements listed above, the 2016 NSPS OOOOa contains well completion requirements for a subset of newly completed oil wells that are hydraulically fractured or refractured. The 2016 NSPS OOOOa also requires reductions from centrifugal compressors, reciprocating compressors, and pneumatic controllers throughout the oil and natural gas source category. These requirements are not analyzed in this RIA because the reconsideration does not include requirements that change the compliance cost or emissions from those achieved under the 2016 NSPS OOOOa requirements.

2.3.2 Unit-Level Compliance Cost Savings and Emission Increases

The requirements affecting fugitive emissions monitoring requirements and certifications of technical infeasibility and closed vent systems are the only sources where changes in compliance cost and emissions resulting from finalized reconsideration requirements have been quantified. Facility-level compliance costs and emission reductions for the fugitive emission requirements for each of the model plants is in Volume 1 of the TSD. For this reconsideration, the TSD and RIA results are based on a more disaggregated set of model plants used to analyze the changes in monitoring requirements among subsets of oil and natural gas well sites than the set used in the 2016 NSPS OOOOa analysis. Whereas the previous analysis included three model plants reflecting either oil, oil with associated gas, or natural gas well sites, this analysis is based on six model plants: non-low production natural gas well sites, non-low production oil-only well sites, non-low production oil with associated gas well sites, low-production natural gas well sites, low-production oil-only well sites, and low-production oil with associated gas well sites. The potential facility-level cost savings and emission increases from the alternatives options examined in this RIA were calculated by subtracting the compliance costs and emissions of the model plants under the alternative options from the compliance costs and emissions of the model plants under the 2018 baseline. Detailed descriptions of what is included in the compliance cost estimates is also provided in Volume 1 of the TSD.

We have also re-evaluated our assumptions regarding equivalent state programs for fugitives that qualify as AMEL. In the proposal analysis, if a well site was in a state determined to have fugitive emissions requirements for well sites effectively equivalent to those of this rule, even if not formally identified as AMEL, we excluded the fugitive emissions monitoring costs of that site due to the proposed rule, including the recordkeeping and reporting required under NSPS OOOOa. In this analysis, we have refined our assumptions to quantify those costs in a way that is more in line with the effects of the state requirements, as well as to improve our estimates of the change in recordkeeping and recording burden as a function of this rule. In the final analysis, we restrict the recordkeeping and reporting savings to well sites that are in states that have fugitive emissions requirements on well sites that quality as AMEL. The operators with well sites that qualify benefit from reduced duplicative recordkeeping and reporting efforts. Specifically, for those well sites we determine to qualify as AMEL, we assume operators save $323 per year for each site in reduced recordkeeping and data management costs and $184 per year for each site in reduced annual reporting costs, resulting in a total savings of $507 per year for each site.

The cost of certifications being performed by a professional engineer was not included in the analysis of the 2016 rule. This analysis updates baseline cost estimates to include professional engineer certification costs, as well as estimates the savings from allowing the certifications to be performed by an in-house engineer. The cost of a certification by a professional engineer is estimated to be just under $4,500 per certification, and the cost of the same certification performed by an in-house engineer is estimated to be about $2,950 per certification. Therefore, the cost savings per certification is estimated to be about $1,550 per certification.22

2.3.3 Projection of Affected Facilities

The second step in estimating national costs and emissions impacts of the reconsideration is projecting the number of NSPS and reconsideration-affected facilities. We first update the number of NSPS-affected facilities under the updated 2018 baseline. Then we estimate the projection of reconsideration-affected facilities, which are facilities that would be expected to change their control activities as a result of this reconsideration. Facilities in states with similar state-level requirements and facilities with only recordkeeping requirements are not included within the estimates of reconsideration-affected facilities.

We analyze the effects of this final action on cost and emissions compared to the 2018 baseline. The 2018 baseline includes the costs and emissions of the projected NSPS-affected facilities, after accounting for updated assumptions and data. NSPS-affected facilities include facilities that are new or modified since the 2015 NSPS OOOOa proposal and were/are expected to change control activities as a result of the 2016 NSPS OOOOa, starting from a baseline of a world without the 2016 NSPS OOOOa. Over time, more facilities are newly established or modified in each year and, to the extent the facilities remain in operation in future years, the total number of facilities subject to the 2016 NSPS OOOOa accumulates. As in the final 2016 NSPS RIA, this analysis assumes that all new equipment and facilities established from 2015 through 2024 are still in operation in 2025.

The reconsideration-affected facilities are estimated as the subset of the NSPS-affected facilities that are expected to change control activities as a result of this reconsideration. These facilities include sources that became affected facilities under the 2016 NSPS OOOOa, prior to the effective date of this final action and are assumed to still be in operation, as well as those that are projected to become newly affected sources in the future, and are expected to change what their monitoring frequency would have been as a result of this final action. For the finalized option, these sources include fugitive emissions sources at well sites outside of the Alaskan North Slope and compressor stations both outside of and on the Alaskan North Slope.23 Reconsideration-affected sources that require a certification are only affected under the projection of newly affected sources. Sources that have already completed professional engineer certifications are not counted as reconsideration-affected sources.

EPA has projected affected facilities using a combination of historical data from the U.S. GHG Inventory (GHGI), DI Desktop, and projected activity levels taken from the Energy Information Administration (EIA) AEO. EPA derived typical counts for new gathering and boosting, and transmission and storage compressor stations by averaging the year-to-year changes over the past ten years in the GHGI. New and modified well sites are based on the count of wells in 2014 from DI Desktop, and projections and growth rates consistent with the drilling activity in the AEO. For this RIA, the projections have been updated from the 2016 NSPS RIA to reflect the projection estimates in the 2018 AEO.

The 2018 AEO (along with historical year information from previous AEOs) reflects a significant drop in oil and gas drilling between 2014 and 2016, followed by projected increases from 2016 through 2025. While the 2018 AEO projects that oil and gas well drilling will more than double from about 14 thousand wells in 2016 to about 30 thousand wells in 2025, this projection is about 40 percent lower than was projected in the 2015 AEO, which was previously used. In comparison to the 2015 AEO, the 2018 AEO shows about 11 percent lower crude oil production and about 17 percent higher dry natural gas production, indicating an increase in estimated production per well.

This RIA includes an enhanced analysis with respect to previous oil and gas NSPS RIA analyses by including year-by-year results over the 2014 to 2025 analysis period and better disaggregating facilities by vintage and production levels. While it is desirable to analyze impacts beyond 2025 in this RIA, EPA has chosen not to, largely because of the limited information available to model long-term dynamics in practices and equipment in the oil and gas industry. For example, EPA has limited information on how practices, equipment, and emissions at new facilities evolve as they age or may be shut down. The current analysis assumes that newly established facilities remain in operation for the entire analysis period, which would be less realistic for longer-term analysis. In addition, in a dynamic industry like oil and natural gas, technological progress in control technology is also likely to change significantly over a longer time horizon.

We also reviewed state regulations and permitting requirements which require mitigation measures for many emission sources in the oil and natural gas sector. Detailed information is included in the TSD and in the memorandum Equivalency of State Fugitive Emissions Programs for Well Sites and Compressor Stations to Proposed Standards at 40

CFR Part 60, Subpart OOOOa ("State memo"), located at Docket ID No. EPA-HQ-OAR-2017-0483.[24] This analysis was done for the 2016 NSPS RIA, with the states of Colorado, Utah, Ohio and Wyoming expected to result in broadly similar overall emissions reductions. For this RIA, state regulations and permitting requirements were reexamined. While the program designs in each of the states examined differs from the 2016 NSPS OOOOa, for this RIA analysis, the current requirements in Colorado, Utah, Ohio, Pennsylvania, and California are expected to result in broadly similar overall emissions reductions. California and Pennsylvania have been added as states with similar requirements for this analysis because the requirements in the states have been finalized since the promulgation of the 2016 NSPS OOOOa. The requirements in Wyoming are no longer considered to be equivalent for purposes of the RIA because they are facility-specific permit requirements and are not applicable to the entire state. Requirements in Texas are not included as broadly equivalent requirements in this analysis because they include a permit by rule, which we do not consider equivalent in terms of overall emissions reductions.[25] For more information on the states that were examined and why they are or are not considered equivalent, see the TSD and the State memo, both of which are available in the docket.[26]

Applicable facilities in these five states are not included in the estimates of incrementally affected facilities presented in the RIA, as sources in those states would be expected to control emissions at a comparable level regardless of the reconsidered federal standards. This means that any additional costs and benefits incurred by facilities in these states to comply with the federal standards beyond the state requirements (e.g., recordkeeping or verification requirements) are not reflected in this RIA.

Table 2-2 presents the number of reconsideration-affected sources for each year of analysis after generally accounting for state regulations. In addition to the caveats regarding facilities affected by state regulations described above, facilities with only recordkeeping requirements are also not included within incrementally affected facilities.

Table 2-2 Reconsideration-Affected Source Counts of the Finalized Option 2 Compared to the 2018 Baseline, 2019-2025

Year	Incrementally Affected Sources[1]	Total Affected Sources[2]
2019	9,800	44,000
2020	11,000	54,000
2021	11,000	64,000
2022	11,000	74,000
2023	12,000	85,000
2024	12,000	

96,000

2025

12,000

110,000

1 Incrementally reconsideration-affected sources includes sources that are newly affected in each year.

2 Total reconsideration-affected sources includes sources that are projected to change their control activity as a result of the reconsideration in each year. These include sources that are newly affected in each year plus the sources from previous years that experience a change in their compliance activity as a result of this final action compared to the 2018 baseline. The table does not include estimated counts of a) affected facilities in states with similar state-level requirements to the finalized option, b) NSPS-affected facilities whose controls are unaffected by the reconsideration.

The estimates for affected well sites are based on the count of new and modified wells in 2014 from DI Desktop, and then projected using year-by-year growth rates from the AEO. The estimates for other affected sources are based upon projections of new sources alone, and do not include replacement or modification of existing sources. While some of these sources are unlikely to be modified, particularly pneumatic pumps and controllers, the impact estimates may be under-estimated due to the focus on new sources. Newly constructed affected facilities are estimated based on averaging the year-to-year changes in the past 10 years of activity data in the Greenhouse Gas Inventory for compressor stations, pneumatic pumps, compressors, and pneumatic controllers. The approach averages the number of newly constructed units in all years. In years when the total count of equipment decreased, there were assumed to be no newly constructed units.

2.3.4 Emissions Increases

Table 2-3 summarizes the national increase in emissions associated with the finalized Option 2 compared to the updated 2018 baseline as described in Section 2.2. The only expected impacts on VOC, methane, and hazardous air pollutant (HAP) emissions from this final action are likely to be from reducing the monitoring frequency for affected compressor stations on the Alaskan North Slope. However, as noted above, EPA does not have information that enables the projection of emissions changes that may result from reducing the frequency of fugitive emision monitoring at the Alaskan sites. All other finalized changes to the 2016 NSPS OOOOa that are a part of this final action are not expected to lead an changes in emissions compared to the 2018 baseline.27

Table 2-3 Increase in Emissions under the Finalized Option 2 Compared to the 2018 Baseline, 2019-2025

Emission Changes

Methane

(short tons)

VOC

(short tons)

HAP

(short tons)

Methane

(metric tons CO2 Eq.)

2019

0

0

0

0

2020

0

0

0

0

2021

0

0

0

0

2022

0

0

0

0

2023

0

0

0

0

2024

0

0

0

0

2025

0

0

0

0

Total

0

0

0

0

2.3.5 Forgone Product Recovery

Fugitive emissions monitoring is assumed to increase the capture of methane and VOC emissions that would otherwise be vented to the atmosphere with no fugitive emissions monitoring program, and we assume that a large proportion of the averted methane emissions can be directed into natural gas production streams and sold. However, as there are no projected emissions changes under the finalized Option 2, there is no projected change in natural gas recovery and, therefore, no change in potential revenue.

Option 3, which reduces the frequency of the survey and repair program for compressor stations, leads to a projected reduction in the amount of natural gas that is assumed to be captured and sold, leading to forgone revenue.[28] Detailed results for Option 3 are presented in Section 2.4 below. When including the decrease in natural gas recovery in the cost savings analysis, we use the projections of natural gas prices provided in the EIA's 2018 AEO reference case. The AEO projects Henry Hub natural gas prices between $3.40 and $4.07 in $/MMBtu in 2017 dollars.[29] We adjust those prices to be between $3.09 and $3.70 in $/Mcf (using the conversion of 1 MMBtu = 1.028 Mcf) in 2016 dollars (using the GDP-Implicit Price Deflator) at the wellhead.[30]

2.3.6 Compliance Cost Savings

Table 2-4 summarizes the cost savings and forgone revenue from product recovery for the evaluated emissions sources and points. What we call planning costs in this analysis are a part of what were included in the capital cost estimates in the 2016 NSPS RIA; however, in this RIA we assume there are no capital equipment purchases. Instead, the analogous costs in this RIA include the cost of creating the survey monitoring plan for the fugitives monitoring requirement and completing the required certifications. The annual operating and maintenance cost savings are all attributed to the fugitives monitoring requirement and include the cost of performing the surveys, as well as the costs of performing repairs. The planning cost savings in the table represent savings in the total planning cost expenditures associated with affected units, including the change in planning cost expenditures made by sources affected prior to the analysis year. The cost savings are estimated by multiplying the unit level cost savings from the updated baseline associated with applicable control and facility type, as explained in Section 2.3, by the number of incrementally affected sources of that facility type. In addition, the cost savings from the streamlining of recordkeeping and reporting are included in the annualized cost savings totals.[31] These cost savings are described more below.

Table 2-4 Cost Savings Estimates for Finalized Option 2 Compared to the 2018 Baseline (millions 2016$)

Cost Savings

Year

Planning Cost Savings[1]

Operating and Maintenance Cost Savings

Annualized Cost Savings (w/o Forgone Product Revenue)[2,3]

Forgone Revenue from Product Recovery

Nationwide Annualized Cost Savings with Forgone Revenue

2019

$4.9

$20

$25

$0

$25

2020

$5.2

$25

$30

$0

$30

2021

$5.4

$30

$35

$0

$35

2022

$5.5

$34

$41

$0

$41

2023

$10.3

$39

$46

$0

$46

2024

$7.8

$44

$52

$0

$52

2025

$9.4

$49

$58

$0

$58

1 The planning cost savings include the cost savings incurred by the newly affected sources for both fugitive emissions monitoring and certifications in each year, as well as the cost savings of fugitive emissions sources that renew survey monitoring plans after 8 years.

2 These cost savings include the planning cost savings for all fugitive emissions monitoring requirements annualized over 8 years at an interest rate of 7 percent, plus the annual operating and maintenance cost savings for the fugitive emissions monitoring requirements every year, plus the cost savings of certifications in each year, plus the cost savings from streamlined recordkeeping and reporting.

3 Sums may not total due to independent rounding.

The cost of designing, or redesigning, the fugitive emissions monitoring program occurs every 8 years to comply with the 2016 NSPS OOOOa requirements. The lifetime of the monitoring program does not change in this reconsideration. The reduction in planning costs in each year outlined in Table 2-4 includes the estimated reduction in the costs of designing a fugitive emissions monitoring program for the new reconsideration-affected sources in that year, plus the reduction in the cost of redesigning an existing program for sources that became affected previously. The first year a redesign cost is included in the planning cost calculation is 2023, as we assume the first NSPS-affected sources completed monitoring plans in 2016, the first year the 2016 NSPS OOOOa affected sources completed compliance activities. The decrease in these program design costs were added to the cost savings of closed vent system and technical infeasibility certifications in each year to get the total planning cost savings for each year.

The fugitive emissions monitoring program design cost savings, annualized over the expected lifetime of 8 years at an interest rate of 7 percent, is added to the annual cost savings of implementing the fugitive emissions monitoring program, the cost savings of in house certifications in each year, and the cost savings from streamlined recordkeeping and reporting to get the annualized cost savings in each year compared to the 2018 baseline. The forgone value of product recovery is then added to estimate the total annualized cost savings in each year.

Table 2-5 illustrates the sensitivity of compliance cost and emissions analysis results of the finalized Option 2 to the choice of discount rate. We present costs using discount rates of 7 percent and 3 percent based on the OMB Circular A-4.32 The table shows that the choice of discount rate has minor effects on the nationwide annualized cost savings of the reconsideration.

Table 2-5 Estimated Cost Savings of the Finalized Option 2, 2019-2025, using 3 and 7 Percent Discount Rates (millions 2016$)

	7 Percent			3 Percent		
Year	Annualized Cost Savings (without Product Recovery)	Forgone Revenue from Product Recovery	Nationwide Annualized Cost Savings with Product Recovery	Annualized Cost Savings (without Product Recovery)	Forgone Revenue from Product Recovery	Nationwide Annualized Cost Savings with Product Recovery
2019	$25	$0	$25	$24	$0	$24
2020	$30	$0	$30	$29		

$0

$29

2021

$35

$0

$35

$35

$0

$35

2022

$41

$0

$41

$40

$0

$40

2023

$46

$0

$46

$46

$0

$46

2024

$52

$0

$52

$51

$0

$51

2025

$58

$0

$58

$57

$0

$57

The choice of discount rate has a very small effect on nationwide annualized cost savings. Discount rate generally affects estimates of annualized costs for controls with high planning or capital costs relative to annual costs. In this analysis, the planning cost savings related to fugitive emissions surveys, plus the cost savings of closed vent system design and technical infeasibility certifications, are small relative to the annual cost savings related to fugitive emissions surveys, so the interest rate has little impact on annualized cost savings for these sources.

2.3.7 Comparison of Regulatory Alternatives

Table 2-6 presents a comparison of projected emissions and compliance cost impacts of the regulatory alternatives in 2020 and 2025. The most stringent option, Option 1, would finalize no changes in the fugitive emissions monitoring requirements from the 2016 NSPS OOOOa requirements. As a result, there are no changes in projected emissions and compliance costs compared to the 2018 baseline for Option 1. For finalized Option 2, while there are no projected emission impacts, there are projected cost savings from streamlinging fugtive emissions monitoring, certifying several state programs as AMEL, and allowing the use of in-house engineers for certifying CVS. The change from finalized Option 2 to Option 3 decreases the frequency of fugitive emissions monitoring from quarterly to seminannual. We assume the percentage emissions reductions from quarterly and semiannual fugitive emissions monitoring program are 80 percent and 60 percent, respectively.[33] Natural gas recovery also varies as a result of survey frequency, as do compliance costs.

Table 2-6 Comparison of Regulatory Alternatives to 2018 Baseline, 2020 and 2025

Regulatory Alternative	Option 1	Option 2 (finalized)	Option 3
Total Impacts, 2020			
Increase in Emissions			
Methane Emissions (short tons/year)	0	0	6,000
VOC Emissions (short tons/year)	0	0	1,000
Decrease in Natural Gas Recovery (Mcf) (millions)	0	0	0.4
Cost Savings			
Planning Cost Savings	$0	$5.2	$5.2
Annualized Cost Savings w/o Forgone Revenue			

$0

$30

$37

Annualized Cost Savings with Forgone Revenue

$0

$30

$36

Total Impacts, 2025

Increase in Emissions

Methane Emissions (short tons/year)

0

0

12,000

VOC Emissions (short tons/year)

0

0

2,000

Decrease in Natural Gas Recovery (Mcf) (millions)

0

0

0.7

Cost Saving

Planning Cost Savings

$0

$9.4

$9.4

Annualized Cost Savings w/o Forgone Revenue

$0

$58

$71

Annualized Cost Savings with Forgone Revenue

$0

$58

$68

As can be seen in Table 2-6, the most stringent Option 1 results in no changes in projected annualized costs and emissions. The finalized Option 2 results no changes in emissions with a decrease of about $30 million in annualized costs in 2020 and $58 million in 2025. Option 3 results in the largest decrease in costs, as well as an increase in emissions. Option 3 is associated with an estimated decrease of about $36 million in annualized costs in 2020 and $68 million in 2025, after accounting for the value of the decrease in product recovery. Option 3 also results in an estimated increase of about 6,000 short tons per year methane emissions and 1,000 tons per year in VOC emissions in 2020 and 12,000 short tons per year methane emissions and 2,000 tons per year in VOC emissions in 2025.

2.4 Detailed Compliance Costs and Emissions Tables

The following tables show the full details of the cost savings and increase in emissions by emissions sources for each regulatory option in 2020 and 2025.

Table 2-7 Incrementally Affected Sources, Emissions Increases and Cost Savings, Option 1, 2020

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

0

0

0

0

0

$0

$0

$0

$0

Gathering and Boosting Stations

0

0

0

0

0

$0

$0

$0

$0

Transmission Compressor Stations

0

0

0

0

0

$0

$0

$0

$0

Certifications

CVS and Technical Infeasibility

0

0

0

0

0

$0

$0

$0

$0

Reporting and Recordkeeping

TOTAL

0

0

0

0

0

$0

$0

$0

$0

Table 2-8 Incrementally Affected Sources, Emissions Increases and Cost Savings, Option 1, 2025

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

0

0

0

0

0

$0

$0

$0

$0

Gathering and Boosting Stations

0

0

0

0

0

$0

$0

$0

$0

Transmission Compressor Stations

0

0

0

0

0

$0

$0

$0

$0

Certifications

CVS and Technical Infeasibility

0

0

0

0

0

$0

$0

$0

$0

Reporting and Recordkeeping

TOTAL

0

0

0

0

0

$0

$0

$0

$0

Table 2-9 Incrementally Affected Sources, Emissions Increases and Cost Savings, Finalized Option 2, 2020

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

52,000

0

0

0

0

$3.7

$24

$0.0

$27

Gathering and Boosting Stations

1,300

0

0

0

0

$0.1

$1

$0

$1

Transmission Compressor Stations

230

0

0

0

0

$0.0

$0

$0

$0

Certifications

CVS and Technical Infeasibility

900

0

0

0

0

$1.4

$0

$0

$1

Reporting and Recordkeeping

TOTAL

54,000

0

0

0

0

$5.2

$25

$0.0

$30

Table 2-10 Incrementally Affected Sources, Emissions Increases and Cost Savings, Finalized Option 2, 2025

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

100,000

0

0

0

0

$7.8

$48

$0.0

$54.5

Gathering and Boosting Stations

2,300

0

0

0

0

$0.2

$2

$0.0

$1.7

Transmission Compressor Stations

420

0

0

0

0

$0.0

$0

$0.0

$0.3

Certifications

CVS and Technical Infeasibility

950

0

0

0

0

$1.5

$0

$0

$1.5

Reporting and Recordkeeping

TOTAL

110,000

0

0

0

0

$9.4

$49

$0.0

$58

Table 2-11 Incrementally Affected Sources, Emissions Increases and Cost Savings, Option 3, 2020

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

52,000

0

0

0

0

$3.7

$24

$0.0

$27

Gathering and Boosting Stations

1,300

4,200

1,200

44

96,000

$0.1

$7

$0.8

$6

Transmission Compressor Stations

230

2,100

58

2

47,000

$0.0

$1.2

$0.4

$0.8

Certifications

CVS and Technical Infeasibility

900

0

0

0

0

$1.4

$0

$0

$1.4

Reporting and Recordkeeping

TOTAL

54,000

6,300

1,200

46

140,000

$5.2

$32

$1.2

$36

Table 2-12 Incrementally Affected Sources, Emissions Increases and Cost Savings, Option 3, 2025

Source/Emissions Point

Projected No. of Reconsideration-affected Sources

Total Increase in Emissions

National Cost Savings

Methane (short tons)

VOC (short tons)

HAP (short tons)

Methane (metric tons CO2e)

Planning Cost Savings

Operating and Maintenance

Forgone Product Recovery

Total Annualized Cost Savings with Forgone Revenues

Fugitive Emissions

Well sites

100,000

0

0

0

0

$7.8

$48

$0

$55

Gathering and Boosting Stations

2,300

7,800

2,200

81

180,000

$0.2

$12

$1.7

$11

Transmission Compressor Stations

420

3,800

110

3

87,000

$0.0

$2.2

$0.73

$1.5

Certifications

CVS and Technical Infeasibility

950

0

0

0

0

$1.5

$0

$0

$1.5

Reporting and Recordkeeping

TOTAL

110,000

12,000

2,300

84

260,000

$9.4

$62

$2

$68

2.5 Present Value and Equivalent Annual Value of Cost Savings

This section presents the economic cost impacts of this final action in a present value (PV) framework in compliance with E.O. 13771, Reducing Regulation and Controlling Regulatory Costs as this final action is be considered a deregulatory action. The stream of the estimated cost savings for each year from 2019 through 2025 is discounted back to 2016 using both a 7 and 3 percent discount rate and summed to estimate the PV of the cost savings. This PV represents the sum of the total annual cost savings over the 2019 to 2025-time horizon. The PV is then used to estimate the equivalent annualized value (EAV) of the cost savings. The EAV is the annualized PV of the cost savings. In other words, the EAV takes the "lumpy" stream of cost savings and converts them into a single annual value that, when added together, equals the original stream of values in PV terms.

As above, all costs are cost savings and are presented as the change in costs of the analyzed option compared to the 2018 baseline in 2016 dollars. Section 2.4 presents the annualized cost savings of the finalized Option 2; however, the cost savings used to estimate the PV are the un-annualized cost savings in each year. In the case of this analysis, using the annualized values would return results very similar to using the unannualized values because the portion of the total cost savings that is annualized (the planning cost savings) is very small.

For this RIA, we evaluate the change in costs for each year where reconsideration-affected sources are expected to change their compliance activities from the 2016 NSPS OOOOa requirements as a result of this reconsideration, through 2025. In the case of this final action, the change in compliance activities lead to cost savings. We have chosen not to evaluate impacts beyond 2025 in part due to the limited information available to model long-term dynamics in practices and equipment in the oil and gas industry. In addition, the oil and natural gas industry is dynamic, and technological progress in control technology is likely to change significantly over a longer time horizon.

Table 2-13 shows the stream of cost savings for each year from 2019 through 2025. Planning cost savings are estimated as the sum of the difference in costs of the design of fugitive emissions monitoring plans for new reconsideration-affected facilities, the difference in costs of the redesign of fugitive emissions monitoring plans for reconsideration-affected facilities that were affected by the 2016 NSPS OOOOa at least 8 years prior, and the difference in costs of certification for closed vent system design and pneumatic pump technical infeasibility for new reconsideration-affected sources compared to the updated baseline. Total cost savings are the sum of the planning cost savings and annual operating cost savings. Over time, with the addition of new reconsideration affects sources, the planning cost savings and annual operating cost savings increase.

Table 2-13 Estimated Cost Savings for the Finalized Option 2, 2019-2025 (millions 2016$)

Year

Planning Cost Savings1

Operating and Maintenance Cost Savings

Total Cost Savings Without Forgone Revenue2,3

Forgone Revenue from Product Recovery

Total Cost Savings with Forgone Revenue

2019

$4.9

$20

$25

$0

$25

2020

$5.2

$25

$30

$0

$30

2021

$5.4

$30

$35

$0

$35

2022

$5.5

$34

$40

$0

$40

2023

$10.3

$39

$50

$0

$50

2024

$7.8

$44

$52

$0

$52

2025

$9.4

$49

$59

$0

$59

1 The planning cost savings include the cost savings incurred by the newly affected sources for both fugitive emissions monitoring and certifications in each year, as well as the cost savings of fugitive emissions sources that renew survey monitoring plans after 8 years.

2 Total cost savings include the planning cost savings for all fugitive emissions monitoring, plus the annual operating and maintenance cost savings for the fugitive emissions monitoring requirements every year, plus the cost savings of certifications in each year, plus the cost savings from streamlined recordkeeping and reporting.

3 Sums may not total due to independent rounding.

Table 2-14 shows the stream of cost savings discounted to 2016 using a 7 percent discount rate. The table also shows the PV and the EAV of planning cost savings, annual operating cost savings, forgone revenue from decreased product recovery and the total cost savings (after accounting for the forgone product recovery). The PV of total cost savings is $189 million, and the EAV of total cost savings is about $33 million per year.

Table 2-14 Discounted Cost Savings Estimates for Finalized Option 2 Compared to the 2018 Baseline Using a 7 Percent Discount Rate (millions 2016$)

	Discounted Cost savings			
Year	Planning Cost Savings[1]	Operating and Maintenance Cost Savings	Forgone Revenue from Product Recovery	Total Cost Savings with Forgone Revenue[2]
2019	$4.0	$17	$0	$21
2020	$4.0	$19	$0	$23
2021	$3.8	$21	$0	$25
2022	$3.7	$23	$0	$27

2023	$6.4	$25	$0	$31
2024	$4.6	$26	$0	$30
2025	$5.1	$27	$0	$32
PV	$32	$157	$0	$189
EAV	$5.5	$27	$0	$33

The cost savings in each year are discounted to 2016. Sums may not total due to independent rounding.

1 The planning cost savings include the cost savings incurred by the newly affected sources for both fugitive emissions monitoring and certifications in each year, as well as the cost savings of fugitive emissions sources that renew survey monitoring plans after 8 years discounted to 2016.

2 Total cost savings include the planning cost savings for all fugitive emissions monitoring, plus the annual operating and maintenance cost savings for the fugitive emissions monitoring requirements every year, plus the cost savings of certifications in each year, plus the cost savings from streamlined recordkeeping and reporting discounted to 2016.

Table 2-15 shows the discounted cost savings of the finalized Option 2, as well as the two alternative options, from 2019 to 2025 compared to the 2018 baseline, along with the PV and EAV of those cost savings, estimated using a 7 percent discount rate. Option 1 results in no quantified savings. Finalized Option 2 results in about $189 million in the PV of total cost savings, or about $33 million per year in the EAV. Option 3 leads to a PV of about $223 million in savings than the 2018 baseline, after accounting for the forgone value of the decrease in product recovery, or about $39 million per year in the EAV.

Table 2-15 Comparison of Regulatory Alternatives to 2018 Baseline Using a 7 Percent Discount Rate

Regulatory Alternatives

Option 1

Option 2 (finalized)

Option 3

Present Value of Cost Savings

Cost savings (millions 2016$)

Planning Cost Savings

$0

$32

$32

Total Cost Savings w/o Forgone Revenue

$0

$189

$231

Total Cost Savings with Forgone Revenue

$0

$189

$223

EAV of Cost Savings

Cost savings (millions 2016$)

Planning Cost Savings

$0

$5.5

$5.5

Total Cost Savings w/o Forgone Revenue

$0

$33

$40

Total Cost Savings with Forgone Revenue

$0

$33

$39

Table 2-16 shows how the choice of discount rate affects the PV and EAV estimates. A lower discount rate results in the higher cost savings in later years having a greater impact on the PV and EAV than would results under a higher discount rate. Therefore, the PV and EAV for the cost savings are higher when using a 3 percent discount rate than when using a 7 percent discount rate. Using a 3 percent discount rate increases the PV of the cost savings by 27 percent from the estimates using a 7 percent discount rate. For the EAV, using a 3 percent discount rate increases the cost savings by 12 percent from the estimates using a 7 percent discount rate.

Table 2-16 Discounted Cost Savings for the Finalized Option 2 using 7 and 3 Percent Discount Rates Compared to the 2018 Baseline (millions 2016$)

7 Percent

3 Percent

Year

Total Annual Cost Savings (without forgone revenue)

Forgone Revenue from Product Recovery

Total Cost Savings (with forgone revenue)1

Total Annual Cost Savings (without forgone revenue)

Forgone Revenue from Product Recovery

Total Cost Savings (with forgone revenue) 1

2019

$21

$0

$21

$23

$0

$23

2020

$23

$0

$23

$27

$0

$27

2021

$25

$0

$25

$30

$0

$30

2022

$27

$0

$27

$33

$0

$33

2023

$31

$0

$31

$40

$0

$40

2024

$30

$0

$30

$41

$0

$41

2025

$32

$0

$32

$45

$0

$45

PV

$189

$0

$189

$240

$0

$240

EAV

$33

$0

$33

$37

$0

$37

The cost savings in each year are discounted to 2016. Sums may not total due to independent rounding.

1 Total cost savings include the planning cost savings for all fugitive emissions monitoring, plus the annual operating and maintenance cost savings for the fugitive emissions monitoring requirements every year, plus the cost savings of certifications in each year, plus the cost savings from streamlined recordkeeping and reporting discounted to 2016.

2.6 Forgone Benefits

The 2016 NSPS OOOOa regulated methane and VOC emissions in the oil and natural gas sector. For the 2016 NSPS OOOOa, EPA projected climate and ozone benefits from methane reductions, ozone and fine particulate matter (PM2.5) health benefits from VOC reductions, and health benefits from ancillary HAP emission reduction. These benefits were projected to occur because the control techniques to meet the standards simultaneously reduce methane, VOC, and HAP emissions.34 As described in the subsequent sections, and in greater detail in the RIA for the proposed action,35 these pollutants are associated with substantial climate, health, and welfare effects.

Reducing the monitoring frequency for affected compressor stations on the Alaskan North Slope may affect the level of methane, VOC, and hazardous air pollutant (HAP) emissions. However, as noted above, EPA does not have sufficient information to project changes in emissions that may result from reducing the frequency of fugitive emision monitoring at the Alaskan sites. Consequently, we project the finalized Option 2 to have no quantifiable effect on emissions, meaning that the projected emissions redutions and associated benefits under NSPS OOOOa are left unchanged by this reconsideration.

2.6.1 Methane Climate Effects and Valuation

Methane is the principal component of natural gas. Methane is also a potent greenhouse gas (GHG) that, once emitted into the atmosphere, absorbs terrestrial infrared radiation, which in turn contributes to increased global warming and continuing climate change. Methane reacts in the atmosphere to form ozone, which also impacts global temperatures. Methane, in addition to other GHG emissions, contributes to warming of the atmosphere, which over time leads to increased air and ocean temperatures; changes in precipitation patterns; melting and thawing of global glaciers and ice sheets; increasingly severe weather events, such as hurricanes of greater intensity; and sea level rise, among other impacts.

According to the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5, 2013), changes in methane concentrations since 1750 contributed 0.48 W/m2 of forcing, which is about 17 percent of all global forcing due to increases in anthropogenic GHG concentrations, and which makes methane the second leading long-lived climate forcer after CO2. However, after accounting for changes in other greenhouse substances such as ozone and stratospheric water vapor due to chemical reactions of methane in the atmosphere, historical methane emissions were estimated to have contributed to 0.97 W/m2 of forcing today, which is about 30 percent of the contemporaneous forcing due to historical greenhouse gas emissions.

The oil and natural gas sector emits significant amounts of methane. The public Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2014 (published 2016) estimates 2014 methane emissions from Petroleum and Natural Gas Systems (not including petroleum refineries and petroleum transportation) to be 232 MMt CO2 Eq. In 2014, total methane emissions from the oil and natural gas industry represented 32 percent of the total methane emissions from all sources and account for about 3 percent of all CO2 Eq. emissions in the U.S., with the combined petroleum and natural gas systems being the largest contributor to U.S. anthropogenic methane emissions (U.S. EPA, 2016c).

The 2016 NSPS OOOOa was expected to result in climate-related benefits by reducing methane emissions. The proposed changes would therefore forgo climate-related benefits associated with these emissions reductions as discussed above. To give a sense of the magnitude of the emissions increases under the unselected Option 3 (presented in Table 2-6), the forgone methane reductions estimated for 2020 (0.14 million metric tons CO2 Eq.) are equivalent to about 0.06 percent of the methane emissions for this sector reported in the U.S. GHGI for 2014 (about 232 million metric tons CO2 Eq. are from petroleum and natural gas production and gas processing, transmission, and storage). Expected forgone emission reductions in 2025 (about 0.3 million metric tons CO2 Eq.) are equivalent to around 0.13 percent of 2014 emissions. As it is expected that emissions from this sector would increase over time, the estimates compared against the 2014 emissions would likely overestimate the percent of total emissions in 2020 and 2025.

We estimate the forgone climate benefits for Option 3 using an interim measure of the domestic social cost of methane (SC-CH4). The SC-CH4 is an estimate of the monetary value of impacts associated with marginal changes in CH4 emissions in a given year. It includes a wide range of anticipated climate impacts, such as net changes in agricultural productivity and human health, property damage from increased flood risk, and changes in energy system costs, such as reduced costs for heating and increased costs for air conditioning. It is typically used to assess the avoided damages as a result of regulatory actions (i.e., benefits of rulemakings that lead to an incremental reduction in cumulative global CH_4 emissions). The SC-CH_4 estimates used in this analysis focus on the direct impacts of climate change that are anticipated to occur within U.S. borders.

The SC-CH_4 estimates presented here are interim values developed under E.O. 13783 for use in regulatory analyses until an improved estimate of the impacts of climate change to the U.S. can be developed based on the best available science and economics. E.O. 13783 directed agencies to ensure that estimates of the social cost of greenhouse gases used in regulatory analyses "are based on the best available science and economics" and are consistent with the guidance contained in OMB Circular A-4, "including with respect to the consideration of domestic versus international impacts and the consideration of appropriate discount rates" (E.O. 13783, Section 5(c)). In addition, E.O. 13783 withdrew the technical support documents (TSDs) and the August 2016 Addendum to these TSDs describing the global social cost of greenhouse gas estimates developed under the prior Administration as no longer representative of government policy. The withdrawn TSDs and Addendum were developed by an interagency working group (IWG) that included EPA and other executive branch entities and were used in the 2016 NSPS RIA.

Regarding the two analytical considerations highlighted in E.O. 13783 - how best to consider domestic versus international impacts and appropriate discount rates - current guidance in OMB Circular A-4 is as follows. Circular A-4 states that analysis of economically significant proposed and final regulations "should focus on benefits and costs that accrue to citizens and residents of the United States." Because this action is economically significant as defined in E.O. 12866, Section 3(f)(1), we follow this guidance by adopting a domestic perspective in our central analysis. Regarding discount rates, Circular A-4 states that regulatory analyses "should provide estimates of net benefits using both 3 percent and 7 percent." The 7 percent rate is intended to represent the average before-tax rate of return to private capital in the U.S. economy. The 3 percent rate is intended to reflect the rate at which society discounts future consumption, which is particularly relevant if a regulation is expected to affect private consumption directly. EPA follows this guidance below by presenting estimates based on both 3 and 7 percent discount rates in the main analysis. See the proposal RIA for a discussion the modeling steps involved in estimating the domestic SC-CH_4 estimates based on these discount rates.

The SC-CH_4 estimates developed under E.O. 13783 will be used in regulatory analysis until improved domestic estimates can be developed, which will take into consideration the recent recommendations from the National Academies of Sciences, Engineering, and Medicine (2017) for a comprehensive update to the current methodology to ensure that the social cost of greenhouse gas estimates reflect the best available science. While the Academies' review focused on the methodology to estimate the social cost of carbon (SC-CO_2), the recommendations on how to update many of the underlying modeling assumptions also pertain to the SC-CH_4 estimates since the framework used to estimate SC-CH_4 is the same as that used for SC-CO_2.

Table 2-17 presents the average domestic SC-CH_4 estimates across all the model runs for each discount rate for emissions occurring in 2019 to 2025. As with the global SC-CH_4 estimates, the domestic SC-CH_4 increases over time because future emissions are expected to produce larger incremental damages as physical and economic systems become more stressed in response to greater climatic change and because GDP is growing over time and many damage categories are modeled as proportional to gross GDP.

Table 2-17 Interim Domestic Social Cost of CH_4, 2019-2025 (in 2016$ per metric ton CH_4)*

Year	Discount Rate and Statistic	
	7% Average	3% Average
2019	$53	

$170

2020

55

180

2021

58

180

2022

60

190

2023

63

190

2024

65

200

2025

68

200

* SC-CH4 values are stated in $/metric ton CH4 and rounded to two significant digits. The estimates vary depending on the year of CH4 emissions and are defined in real terms, i.e., adjusted for inflation using the GDP implicit price deflator.

Table 2-18 presents the monetized forgone domestic climate benefits of Option 3. Forecasted increases in methane emissions in a given year, expected as a result of the regulatory action, are multiplied by the SC-CH4 estimate for that year. Under Option 3, the forgone climate benefits vary by discount rate and year and range from about $0.3 million to approximately $0.7 million under a 7 percent discount rate, and from about $0.8 million to approximately $2 million under a 3 percent discount rate. The table also shows the annual forgone benefits discounted back to 2016 and the PV and the EAV for the 2019 through 2025 time horizon under each discount rate. The PV of forgone benefits under a 7 percent discount rate is about $2 million, with an EAV of about $0.4 million per year. The PV of forgone benefits under a 3 percent discount rate of $8 million, with an EAV of about $1.3 million per year.36

Table 2-18 Estimated Forgone Domestic Climate Benefits of Option 3, 2019-2025 (millions, 2016$)

Undiscounted

Discounted back to 2016

Year

7 percent

3 Percent

7 percent

3 Percent

2019

$0.3

$0.8

$0.2

$0.7

2020

$0.3

$1.0

$0.2

$0.9

2021

$0.4

$1.2

$0.3

$1.0

2022

$0.5

$1.4

$0.3

$1.2

2023

$0.5

$2

$0.3

$1.3

2024

$0.6

$2

$0.4

$1.5

2025

$0.7

$2

$0.4

$2

PV

$2

$8

EAV

$0.4

$1.3

The limitations and uncertainties associated with the global SC-CH4 estimates, which were discussed in detail in the 2016 NSPS RIA, likewise apply to the domestic SC-CH4 estimates presented in this analysis.37 Some uncertainties are captured within the analysis while other areas of uncertainty have not yet been quantified in a way that can be modeled. The proposal RIA provides a detailed discussion of uncertainties, including limitations specific to the estimation of SC-CH4, and ways in which the modeling underlying the development of the SC-CH4 estimates used in this analysis addresses quantified sources of uncertainty. The proposal RIA also presents a sensitivity analysis to show consideration of the uncertainty surrounding discount rates over long time horizons.

Only the least stringent unselected option evaluated in this RIA, Option 3, is projected to increase emissions of methane, VOC, and HAP. Because the finalized Option 2 has no projected impacts on emissions or benefits, but an unselected option does have projected impacts, we present this relativly brief assessment of potential impacts of changes in emissions of methane, VOC, and HAP. As in the 2016 NSPS RIA, the only estimated forgone benefits monetized in this RIA are methane-related climate impacts.

2.6.2 VOC and HAP Effects

VOCs are a precursor to ozone and PM2.5, and some VOCs are also Hazardous Air Pollutants (HAP). While Option 2 is projected to have no quantified emissions impacts, if Option 3 were to be selected for finalization, we expect that the forgone VOC emission reductions would degrade air quality and, associated with exposure to ozone, PM2.5, and HAP, increase ozone formation, exposure to ozone, and the incidence of ozone-related health and welfare effects (U.S. EPA, 2013). However, for reasons described below we are unable to quantify VOC-related health and welfare effects at this time. Rather, we briefly assess the forgone health benefits associated with reducing exposure to these pollutants qualitatively.

When quantifying the incidence and economic value of the human health impacts of air quality changes, the Agency sometimes relies upon reduced-form techniques, often reported as "benefit-per-ton" values that relate air pollution impacts to changes in air pollutant precursor emissions (U.S. EPA, 2018). A small, but growing, literature characterizes the air quality and health impacts from the oil and natural gas sector but does not yet supply the information needed to derive a VOC benefit-per-ton value suitable for a regulatory analysis (Fann et al. 2018; Litovitz et al. 2013; Loomis and Haefele 2017).38 Moreover, the Agency is currently comparing various reduced-form techniques, including benefit-per-ton approaches, to quantifying air quality benefits. For these two reasons, we did not quantify VOC-related health impacts in this RIA. This omission should not imply that these forgone benefits may not exist; rather, it reflects the difficulties in modeling the direct and indirect impacts of the reductions in emissions for this industrial sector with the data currently available.

Human exposure to ambient ozone concentrations is associated with adverse health effects, including premature mortality and cases of respiratory morbidity (U.S. EPA, 2010a) and researchers have associated ozone exposure with adverse health effects in numerous toxicological, clinical and epidemiological studies (U.S. EPA, 2013). Vegetation and ecosystem effects of increased ozone concentrations include reduced growth and/or biomass production in sensitive trees, reduced yield and quality of crops, visible foliar injury, changes to species composition, and changes in ecosystems and associated ecosystem services (U.S. EPA, 2013). Ozone is a well-known short-lived climate forcing greenhouse gas and increased ground level ozone leads to increases in global surface temperature and changes in hydrological cycles (U.S. EPA, 2013).

Available emissions data show that several different HAP are emitted from oil and natural gas operations, either from equipment leaks, processing, compressing, transmission and distribution, or storage tanks. 39 Emissions of eight HAP make up a large percentage of the total HAP emissions by mass from the oil and natural gas sector: toluene, hexane, benzene, xylenes (mixed), ethylene glycol, methanol, ethyl benzene, and 2,2,4-trimethylpentane (U.S. EPA, 2012a). Foregone HAP emission reductions may increase exposure to these toxic pollutants, primarily near the emission sources.

2.7 References

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3 ECONOMIC IMPACT ANALYSIS AND DISTRIBUTIONAL ASSESSMENTS

3.1 Introduction

This section includes four sets of discussion for this final action: energy markets impacts, distributional impacts, small business impacts, and employment impacts.

3.2 Energy Markets Impacts

As it is implemented, the 2016 NSPS OOOOa may have impacts on energy production and markets which would be reduced under the final reconsideration. The 2016 NSPS RIA used the National Energy Modeling System (NEMS) to estimate the impacts to drilling activity, price, and quantity changes in the production of crude oil and natural gas, and changes in international trade of crude oil and natural gas national energy markets as a result of the 2016 NSPS OOOOa.40 In that analysis, EPA estimated the following impacts under the final 2016 NSPS OOOOa:

* Natural gas and crude oil drilling levels would decline slightly over the 2020 to 2025 period (by about 0.17 percent for natural gas wells and 0.02 percent for crude oil wells);

* Crude oil production would not change appreciably under the rule, while natural gas production would decline slightly over the 2020 to 2025 period (about 0.03 percent);

* Crude oil wellhead prices for onshore production in the lower 48 states were not estimated to change appreciably over the 2020 to 2025 period, while wellhead natural gas prices for onshore production in the lower 48 states were estimated to increase

slightly over the 2020 to 2025 period (about 0.20 percent); and,

* Net imports of natural gas were estimated to increase slightly in 2020 (by about 0.12 percent) and in 2025 (by about 0.11 percent), while net imports of crude oil were not estimated to change appreciably over the 2020 to 2025 period.

As described earlier in this RIA, this final reconsideration includes a reduction in the stringency of the requirements on a substantial portion of the sources included in the 2016 NSPS OOOOa. The finalized Option 2 is expected to lead to total cost savings compared to the 2018 baseline. Relative to the baseline, the EAV of cost savings over the 2019-25 timeframe is about $33 million per year. As a result, EPA expects this final deregulatory action to reduce the impacts estimated for the final NSPS in the 2016 NSPS RIA.

3.3 Distributional Impacts

The cost savings and forgone benefits presented above are not expected to be felt uniformly across the population, and may not accrue to the same individuals or communities. OMB recommends including a description of distributional effects, as part of a regulatory analysis, "so that decision makers can properly consider them along with the effects on economic efficiency [i.e., net benefits]. Executive Order 12866 authorizes this approach." (U.S. Office of Management and Budget 2003). Understanding the distribution of the compliance cost savings and forgone benefits can aid in understanding community-level impacts associated with this action. This section discusses the general expectations regarding how cost savings and forgone health benefits might be distributed across the population, relying on a review of recent literature. EPA did not conduct a quantitative assessment of these distributional impacts for the proposed reconsideration, but the qualitative discussion in this section provides a general overview of the types of impacts that could result from this final action.

3.3.1 Distributional Aspects of Compliance Cost Savings

The compliance costs associated with an environmental regulation can impact households by raising the prices of goods and services; the extent of the price increase depends on if and how producers pass-through those costs to consumers. The literature evaluates the distributional effects of introducing a new regulation; as the literature relates to this reconsideration, which is deregulatory, these effects can be interpreted in reverse. Expenditures on energy are usually a larger share of low-income household income than that of other households, and this share falls as income increases. Therefore, policies that increase energy prices have been found to be regressive, placing a greater burden on lower income households (e.g., Burtraw et al., 2009; Hassett et al., 2009; Williams et al. 2015). However, compliance costs will not be solely passed on in the form of higher energy prices, but also through lower labor earnings and returns to capital in the sector. Changes in employment associated with lower labor earnings can have distributional consequences depending on a number of factors (Section 3.5 discusses employment effects further). Capital income tends to make up a greater proportion of overall income for high income households. As result, the costs passed through to households via lower returns to capital tend to be progressive, placing a greater share of the burden on higher income households in these instances (Rausch et al., 2011; Fullerton et al., 2012).

The ultimate distributional outcome will depend on how changes in energy prices and lower returns to labor and capital propagate through the economy and interact with existing government transfer programs. Some literature using an economy-wide framework finds that the overall distribution of compliance costs could be progressive for some policies due to the changes in capital payments and the expectation that existing government transfer indexed to inflation will offset the burden to lower income households (Fullerton et al., 2011; Blonz et al., 2012).41 However, others have found the distribution of compliance costs to be regressive due to a dominating effect of changes in energy prices to consumers (Fullerton 2011; Burtraw, et. al., 2009; Williams, et al., 2015). There may also be significant heterogeneity in the costs borne by individuals within income deciles (Rausch et al., 2011; Cronin et al., 2019). Different classifications of households, such as on the basis of lifetime income rather than contemporaneous annual income, may provide notably different results (Fullerton and Metcalf, 2002; Fullerton et al., 2011). Furthermore, there may be important regional differences in the incidence of regulations. There are differences in the composition of goods consumed, regional production methods, the stringency of a rule, as well as the location of affected labor and capital ownership (the latter of which may be foreign-owned) (e.g. Caron et al. 2017; Hassett et al. 2009).

3.3.2 Distributional Aspects of the Forgone Health Benefits

This section discusses the distribution of forgone health benefits that result from the proposed reconsideration. EPA guidance directs analysts to first consider the distribution of impacts in the baseline, prior to any regulatory action (see U.S. EPA 2016). Often the baseline incidence of health outcomes is greater among low-income or minority populations due to a variety of factors, including a greater number of pollution sources located where low-income and minority populations live, work and play (Bullard, et al. 2007; United Church of Christ 1987); greater susceptibility to a given exposure due to physiology or other triggers (Akinbami 2012); and pre-existing conditions (Schwartz et al 2011). EPA (2016) then recommends analysts examine the distribution of health outcomes under the policy scenarios being considered. Finally, this can be followed by an examination of the change between the baseline and policy scenario, taking note of whether the action ameliorates or exacerbates any pre-existing disparities.

Because the way the health benefits of a rulemaking are distributed is based on the correlation of housing and work locations to changes in atmospheric concentrations of pollutants, it is difficult to fully know the distributional impacts of a rule. Air dispersion models provide some information on changes in pollution, but it may be difficult to identify the characteristics of populations in those affected areas, as well as to perform local air dispersion modeling nationwide. Furthermore, the overall distribution of health benefits will depend on whether and how any households change their housing location choice in response to air quality changes (Sieg et al., 2004).

3.4 Small Business Impacts

The Regulatory Flexibility Act (RFA; 5 U.S.C. §601 et seq.), as amended by the Small Business Regulatory Enforcement Fairness Act (Public Law No. 104121), provides that whenever an agency publishes a proposed rule, it must prepare and make available an initial regulatory flexibility analysis (IRFA), unless it certifies that the rule, if promulgated, will not have a significant economic impact on a substantial number of small entities (5 U.S.C. §605[b]). Small entities include small businesses, small organizations, and small governmental jurisdictions. An IRFA describes the economic impact of the rule on small entities and any significant alternatives to the rule that would accomplish the objectives of the rule while minimizing significant economic impacts on small entities.

An agency may certify that a rule will not have a significant economic impact on a substantial number of small entities if the rule relieves regulatory burden, has no net burden or otherwise has a positive economic effect on the small entities subject to the rule. As described in Section 2 of this RIA, this reconsideration reduces the stringency of the requirements on a substantial portion of the sources included in the 2016 NSPS OOOOa. In addition, the three options being analyzed in this RIA would result in neutral or beneficial effects on the affected facilities, including small businesses. The changes to the regulation decrease burden to the industry through direct changes in the requirements, increased clarity of requirements (for example, through more robust definitions), updating of the AMEL, and the streamlining of recordkeeping and reporting requirements. Relative to the baseline, the reduction in EAV of costs over the 2019-25 time horizon is about $33 million per year. As a result, EPA expects that this final deregulatory action will lessen the impacts estimated for the final NSPS in the 2016 NSPS RIA. We have therefore concluded that this final action will relieve regulatory burden for directly-regulated small entities subject to the relevant reconsidered provisions.

3.5 Employment Impacts

In this section, EPA presents a qualitative discussion of the impacts of this reconsideration on employment.42 E.O. 13777 directs federal agencies to consider a variety of issues regarding the characteristics and impacts of regulations, including the effect of regulations on jobs (Executive Order 13777). Employment impacts of environmental regulations are composed of a mix of potential declines and gains in different areas of the economy over time. Regulatory employment impacts can vary across occupations, regions, and industries; by labor demand and supply elasticities; and in response to other labor market conditions. Isolating such impacts is a challenge, as they are difficult to disentangle from employment impacts caused by a wide variety of ongoing, concurrent economic changes.

Environmental regulation "typically affects the distribution of employment among industries rather than the general employment level" (Arrow et. al. 1996). Even if they are mitigated by long-run market adjustments to full employment, many regulatory actions have transitional effects in the short run (OMB 2015). These movements of workers in and out of jobs in response to environmental regulation are potentially important distributional impacts of interest to policymakers. Transitional job losses experienced by workers operating in declining industries, exhibiting low migration rates, or living in communities or regions where unemployment rates are high are of concern.

A discussion of partial employment impacts for affected entities in the oil and gas industry was completed in the 2016 NSPS RIA using detailed engineering information on labor requirements for each of the control strategies identified in the rule.43 These bottom-up, engineering-based estimates represented only one portion of potential employment impacts within the regulated industry, and did not represent estimates of the net employment impacts of the rule. Labor changes may be required as part of an initial effort to comply with a regulation or required as a continuous or annual effort to maintain compliance. In the 2016 analysis, EPA estimated up-front and continual annual labor requirements by estimating hours of labor required and converting this number to full-time equivalents (FTEs) by dividing by 2,080 (40 hours per week multiplied by 52 weeks). Overall, the 2016 NSPS OOOOa estimated the one-time labor requirement for the affected sector to be about 270 FTEs in 2020 and 2025, and the annual labor requirement was estimated to be about 1,100 FTEs in 2020 and 1,800 FTEs in 2025. Due to data and methodology limitations, other potential employment impacts in the affected industry and impacts in related industries were not estimated.

As the reconsideration is likely to cause little change in oil and natural gas exploration and production, and many aspects of the 2016 NSPS OOOOa requirements are not affected by this reconsideration, demand for labor employed in exploration and production and associated industries is unlikely to change greatly. For the affected oil and natural gas entities, some reductions in labor from 2016 NSPS OOOOa related requirements may be expected under this reconsideration. For this reconsideration, EPA expects there will be slight reductions in the labor required for compliance-related activities associated with the 2016 NSPS OOOOa requirements relating to fugitive emissions monitoring and inspections of closed vent systems. However, due to uncertainties associated with how this reconsideration will influence the portfolio of activities associated with fugitive emissions monitoring-related requirements, EPA is unable to provide quantitative estimates of compliance-related labor changes.

3.6 References

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1

4 COMPARISON OF BENEFITS AND COSTS

4.1 Comparison of Benefits and Costs Across Regulatory Options

In this section, we present a comparison of the benefits and costs of this regulation. To be more consistent with traditional net benefits analysis, we modify the relevant terminology in the following tables, which present the costs, benefits and net benefits for this final action across regulatory options. In this section, we refer to the cost savings as the "benefits" of this final action and the forgone benefits as the "costs" of this final action. The net benefits are the benefits (cost savings) minus the costs (forgone benefits). As explained in the previous sections, all costs and benefits outlined in this RIA are estimated as the change from the updated baseline.

All benefits, costs, and net benefits shown in this section are presented as the PV of the costs and benefits of each option from 2019 through 2025 discounted back to 2016 under both a 7 percent and a 3 percent discount rate, and their associated EAV.

Table 4-1 shows the estimated benefits, costs and net benefits for Option 1, the most stringent option. There are no benefits (avoided compliance costs) or costs (forgone benefits) associated with this option. Therefore, the net benefits equal zero for Option 1.

Table 4-1 Summary of the Present Value (PV) and Equivalent Annualized Value (EAV) of Forgone Monetized Benefits, Cost Savings, and Net Benefits for Option 1 from 2019 through 2025 (millions, 2016$)

	7%		3%	
	PV	EAV	PV	EAV
Benefits (Total Cost Savings)	$0	$0	$0	$0
Cost Savings	$0	$0	$0	$0
Forgone Value of Product Recovery	$0	$0	$0	$0
Costs (Forgone Domestic Climate Benefits)1	$0	$0	$0	

$0

Net Benefits2

$0

$0

$0

$0

Table 4-2 shows the estimated benefits, costs and net benefits for the finalized Option 2. Option 2 results in net benefits greater than those of Option 1, but less than those of Option 3. In this option, we estimate the impact of streamlined fugitive emsisions monitoring reporting and recordkeeping, certififying several states fugitive emissions monitoring programs as AMEL, and in-house certifications. As there are no projected changes in emissions under the finalized Option 2, there are no costs (forgone benefits).

Table 4-2 Summary of the Present Value (PV) and Equivalent Annualized Value (EAV) of Forgone Monetized Benefits, Cost Savings, and Net Benefits for Finalized Option 2 from 2019 through 2025 (millions, 2016$)

7%

3%

PV

EAV

PV

EAV

Benefits (Total Cost Savings)

$189

$33

$240

$37

Cost Savings

$189

$33

$240

$37

Forgone Value of Product Recovery

$0

$0

$0

$0

Costs (Forgone Domestic Climate Benefits)

$0

$0

$0

	$0			
Net Benefits[1]	$189	$33	$240	$37

1 Estimates may not sum due to independent rounding.

Table 4-3 shows the estimated benefits, costs and net benefits for Option 3. Option 3 results in the greatest cost savings, forgone benefits, and net benefits of the three options analyzed. Option 3 is the same as the finalized Option 2 with the exception that fugitive emissions monitoring and repair frequency at compressor stations outside of the Alaskan North Slope are reduced to semiannual.

Table 4-3 Summary of the Present Value (PV) and Equivalent Annualized Value (EAV) of Forgone Monetized Benefits, Cost Savings, and Net Benefits for the Option 3 from 2019 through 2025 (millions, 2016$)

	7%		3%	
	PV	EAV	PV	EAV
Benefits (Total Cost Savings)	$223	$39	$284	$44
Cost Savings	$231	$40	$294	$46
Forgone Value of Product Recovery	$7	$1.3	$9	$1.5
Costs (Forgone Domestic Climate Benefits)[1]	$2.1	$0.4	$8	

$1.3

Net Benefits2

$221

$38

$276

$43

1 1 The forgone benefits estimates are calculated using estimates of the social cost of methane (SC-CH4). SC-CH4 values represent only a partial accounting of domestic climate impacts from methane emissions. See Section 2.6 for more discussion.

2 Estimates may not sum due to independent rounding.

Table 4-4 provides a summary of the direct increase in emissions for each regulatory option. As explained in Section 2, there are no changes in emissions estimated as a result of Option 1. Option 2 results in an increase in emissions compared to both Option 1, and the updated baseline. Option 3 results in the greatest increase in emissions compared to the baseline.

Table 4-4 Summary of Total Emissions Increases across Options, 2019 through 2025

Pollutant	Option 1	Option 2 (finalized)	Option 3
Methane (short tons)	0	0	60,000
VOC (short tons)	0	0	12,000
HAP (short tons)	0	0	400
Methane (metric tons)	0	0	50,000
Methane (million metric tons CO2 Eq.)	0	0	1.3

4.2 Uncertainties and Limitations

Throughout the RIA, we considered a number of sources of uncertainty, both quantitatively and qualitatively, regarding emissions increases, forgone benefits, and cost savings of the final reconsideration. We summarize the key elements of our discussions of uncertainty here:

* Projection methods and assumptions: As discussed in Section 2, over time, more facilities are newly established or modified in each year, and to the extent the facilities remain in operation in future years, the total number of facilities subject to the NSPS accumulates. The impacts of this rule are based on projections and growth rates consistent with the drilling activity in the 2018 Annual Energy Outlook. To the extent actual drilling activities diverge from the Annual Energy Outlook projections, the projected regulatory impacts estimated in this document will diverge. In addition, we assume one hundred percent compliance with the rule, starting from when the source becomes affected. If sources are not complying with the rule, at all or as written, the cost savings may be overestimated.

* Years of analysis: The years of analysis are 2019, to represent the first-year facilities are affected by this reconsideration, through 2025, to represent impacts of the rule over a longer period, as discussed in Section 2.4. While it is desirable to analyze impacts beyond 2025, in this RIA EPA has chosen not to do this largely because of the limited information available on the turnover rate of emissions sources and controls. Extending the analysis beyond 2025 would introduce substantial and increasing uncertainties in projected impacts of the final reconsideration.

* State regulations in baseline: In preparing the impacts analysis, EPA reviewed state regulations and permitting requirements, as discussed in Sections 1 and 2. Applicable facilities in states with similar requirements to the reconsidered NSPS OOOOa are not included in the estimates of incrementally affected facilities presented in the RIA. This means that any additional costs and benefits incurred by facilities in these states to comply with the federal standards beyond the state requirements are not reflected in this RIA.

* Wellhead natural gas prices used to estimate forgone revenues from natural gas recovery: The cost savings estimates presented in this RIA for Option 3 include the forgone revenue associated with the decrease in natural gas recovery resulting from the decrease in emissions reductions. As a result, the national cost savings depends on the price of natural gas. Natural gas prices used in this analysis are from the projection of the Henry Hub price in the 2018 AEO. To the extent actual natural gas prices diverge from the AEO projections, the projected regulatory impacts estimated in this document will diverge.

* Monetized forgone methane-related climate benefits: EPA considered the uncertainty associated with the social cost of methane (SC-CH4) estimates, which were used to calculate the forgone domestic social benefits of the increase in methane emissions projected under the unselected Option 3 of this reconsideration. Some uncertainties are captured within the analysis, while other areas of uncertainty have not yet been quantified in a way that can be modeled.44

* Non-monetized forgone benefits: Numerous categories of forgone health, welfare, and climate benefits are not quantified and monetized in this RIA. These unquantified forgone benefits, including forgone benefits from increases in emissions of methane, VOCs and HAP, are described in detail in Section 2.

United States

Environmental Protection Agency

Office of Air Quality Planning and Standards

Health and Environmental Impacts Division

Research Triangle Park, NC

Publication No. EPA-452/R-19-004

July 2019

1 Found on http://www.regulations.gov under Docket ID No. EPA-HQ-OAR-2017-0483.

2 83 FR 10628.

3 Found under Docket ID No. EPA-HQ-OAR-2010-0505, and at https://www3.epa.gov/ttn/ecas/docs/ria/oilgas_ria_nsps_final_2016-05.pdf.

4 See preamble and response to comments document, which are available in the docket.

5 The 2018 AEO can be found at https://www.eia.gov/outlooks/aeo/.

6 The updated GHGI data used is from the April 2018 release. For information on the inventory, visit https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks.

7 DrillingInfo is a private company that provides information and analysis to the energy sector. More information is available at http://info.drillinginfo.com.

8 For information on additional states that were examined and why they are not considered equivalent, see the TSD and the State memo, both of which are available in the docket.

9 For more information on the model plants, see the TSD.

10 Costs were adjusted to 2016 dollars using the seasonally adjusted annual Gross Domestic Product: Implicit Price Deflator released by the Federal Reserve on January 26, 2018.

11 In this analysis, the DrillingInfo base year was updated from 2012 to 2014. Therefore, the source projection estimates are based on reconsideration-affected facilities established starting in 2014 and continuing through 2025.

12 See Section IV.I of the preamble for a comprehensive summary of changes to recordkeeping and reporting requirements.

13 We determined that all well sites and compressor stations in four states (California, Colorado, Pennsylvania, and Utah) were subject to state requirements at least equivalent to the NSPS OOOOa. Based on analysis received in public comment, we assume that 5.5 percent of sites in Texas and 80 percent of sites in Ohio will qualify for AMEL; the rest are assumed to comply with the requirements in NSPS OOOOa.

14 Emissions should not be affected by this change in certification requirements to the extent that the use of an in-house engineer does not result in any change in the quality of closed vent systems being certified or the number of pneumatic pump technical infeasibility determinations. We do not have any information to estimate the potential for these types of technical changes, if any, when moving from professional engineer certifications to in-house engineer certifications.

15 EPA did not conduct a quantitative assessment of the distributional impacts of the proposed reconsideration, but a qualitative discussion of the distributional aspects of the cost savings and the forgone health benefits of this deregulatory action are provided in Section 3.3.

16 Found at https://www3.epa.gov/ttn/ecas/docs/ria/oilgas_ria_nsps_final_2016-05.pdf.

17 Found on regulations.gov under Docket ID No. EPA-HQ-OAR-2017-0483.

18 Found under Docket ID No. EPA-HQ-OAR-2010-0505, and at https://www3.epa.gov/ttn/ecas/docs/ria/oilgas_ria_nsps_final_2016-05.pdf. Accessed July 13, 2019.

19 See the preamble for more information, at Docket ID No. EPA-HQ-OAR-2017-0483.

20 Docket ID No. EPA-HQ-OAR-2017-0483.

21 Docket ID No. EPA-HQ-OAR-2010-0505-7631.

22 The costs of certification being performed by a professional engineer and by an in-house engineer are explained fully in the TSD.

23 We do not quantify any emissions or cost changes associated with new compressor stations on the Alaskan North Slope. See Volume 2 of the TSD for details.

24 For a more detailed explanation of state programs, the TSD, as well as the memo Equivalency of State Fugitive Emissions Programs for Well Sites and Compressor Stations to Proposed Standards at 40 CFR Part 60, Subpart OOOOa, located at Docket ID No. EPA-HQ-OAR-2017-0483.

25 We do not consider the permit by rule in Texas as equivalent for RIA purposes because they are self-certified permits and we currently have a lack of certainty on the degree of enforcement of these rules.

26 Docket ID No. EPA-HQ-OAR-2017-0483.

27 Emissions should not be affected by the change in certification requirements to the extent that the use of an in-house engineer does not result in any change in the quality of closed vent systems being certified or the number of pneumatic pump technical infeasibility determinations. We do not have any information to estimate the potential for these types of technical changes, if any, when moving from professional engineer certifications to in-house engineer certifications.

28 Operators in the gathering and boosting and transmission and storage parts of the industry do not typically own the natural gas they transport; rather, the operators receive payment for the transportation service they provide. As a result, the unit-level cost and emission reduction analyses supporting best system of emission reduction (BSER) decisions presented in Volume 1 of the TSD do not include estimates of revenue from natural gas recovery as offsets to compliance costs. From a social perspective, however, the increased financial returns from natural gas recovery accrues to entities somewhere along the natural gas supply chain and should be accounted for in the national impacts analysis. An economic argument can be made that, in the long run, no single entity is going to bear the entire burden of the compliance costs or fully receive the financial gain of the additional revenues associated with natural gas recovery. The change in economic surplus resulting from natural gas recovery is going to be spread out amongst different agents via price mechanisms. Therefore, the simplest and most transparent option for allocating these revenues would be to keep the compliance costs and associated revenues together in a given source category and not add assumptions regarding the allocation of these revenues across agents. This is the approach followed in Volume 2 of the TSD, as well as in the 2016 NSPS RIA.

29 Available at: http://www.eia.gov/forecasts/aeo/tables_ref.cfm.

30 An EIA study indicated that the Henry Hub price is, on average, about 11 percent higher than the wellhead price. See http://www.eia.gov/oiaf/analysispaper/henryhub/.

31 See the preamble of the final reconsideration for details on the changes to the recordkeeping and reporting requirements.

32 Found at: https://obamawhitehouse.archives.gov/omb/circulars_a004_a-4/#e.

33 See the TSD for more details on the emission reductions assumptions across fugitive monitoring survey frequencies at well sites and compressor stations.

34 The specific control techniques for the 2016 NSPS OOOOa were also anticipated to have minor disbenefits resulting from secondary emissions of carbon dioxide (CO2), nitrogen oxides (NOX), PM, carbon monoxide (CO), and total hydrocarbons (THC)), and emission changes associated with the energy markets impacts. This final action is anticipated to have minimal to no impact on these secondary emissions.

35 Found under Docket ID No. EPA-HQ-OAR-2017-0483, and at https://www.epa.gov/sites/production/files/2018-09/documents/oil_and_natural_gas_nsps_reconsideration_proposal_ria.pdf.

36 In addition to requiring reporting of domestic impacts, Circular A-4 states that when an agency "evaluate[s] a regulation that is likely to have effects beyond the borders of the United States, these effects should be reported separately" (page 15). This guidance is relevant to the valuation of damages from methane and other GHGs, given that GHGs contribute to damages around the world independent of the country in which they are emitted. The PV of forgone global climate benefits of Option 3 using global SC-CH4 estimates based on both 3 and 7 percent discount rates are $66 million and $14 million, respectively.

37 The SC-CH4 estimates presented in the 2016 NSPS RIA are the same as the SC-CH4 estimates presented in EPA-HQ-OAR-2015-0827-5886, "Addendum to Technical Support Document on Social Cost of Carbon for Regulatory Impact Analysis under Executive Order 12866: Application of the Methodology to Estimate the Social Cost of Methane and the Social Cost of Nitrous Oxide (August 2016)", except the estimates in the 2016 NSPS RIA were adjusted to 2012$. The estimates published in the 2016 NSPS RIA were labeled as "Marten et al. (2014)" estimates. In addition, EPA-HQ-OAR-2015-0827-5886 provides a

detailed discussion of the limitations and uncertainties associated with the SC-GHG estimates.

38 Fann, N., et al. (2018). "Assessing Human Health PM2.5 and Ozone Impacts from U.S. Oil and Natural Gas Sector Emissions in 2025." Environmental Science & Technology 52(15): 8095-8103.

39 The 2014 NATA is available at https://www.epa.gov/national-air-toxics-assessment/2014-national-air-toxics-assessment.

40 See Section 6.2 of the 2016 NSPS RIA.

41 The incidence of government transfer payments (e.g., Social Security) is generally progressive because these payments represent a significant source of income for lower income deciles and only a small source for high income deciles. Government transfer programs are often, implicitly or explicitly, indexed to inflation. For example, Social Security payments and veterans' benefits are adjusted every year to account for changes in prices (i.e., inflation).

42 The employment analysis in this RIA is part of EPA's ongoing effort to "conduct continuing evaluations of potential loss or shifts of employment which may result from the administration or enforcement of [the Act]" pursuant to CAA section 321(a).

43 EPA did not estimate the labor required to perform the professional engineer certification requirements in the 2016 NSPS OOOOa.

44 For more information on the uncertainty associated with the social cost of methane (SC-CH4) please see the RIA associated with the proposal of this reconsideration, which can be found at: https://www.epa.gov/sites/production/files/2018-09/documents/oil_and_natural_gas_nsps_reconsideration_proposal_ria.pdfhttps://www.epa.gov/sites/production/files/2018-09/documents/oil_and_natural_gas_nsps_reconsideration_proposal_ria.pdf. Access July 22, 2019. Chapter 3 and the Appendix in the proposal RIA provide a detailed discussion of the ways in which the modeling underlying the development of the SC-CH4 estimates used in this analysis addresses quantified sources of uncertainty and presents a sensitivity analysis to show consideration of the uncertainty surrounding discount rates over long time horizons.
